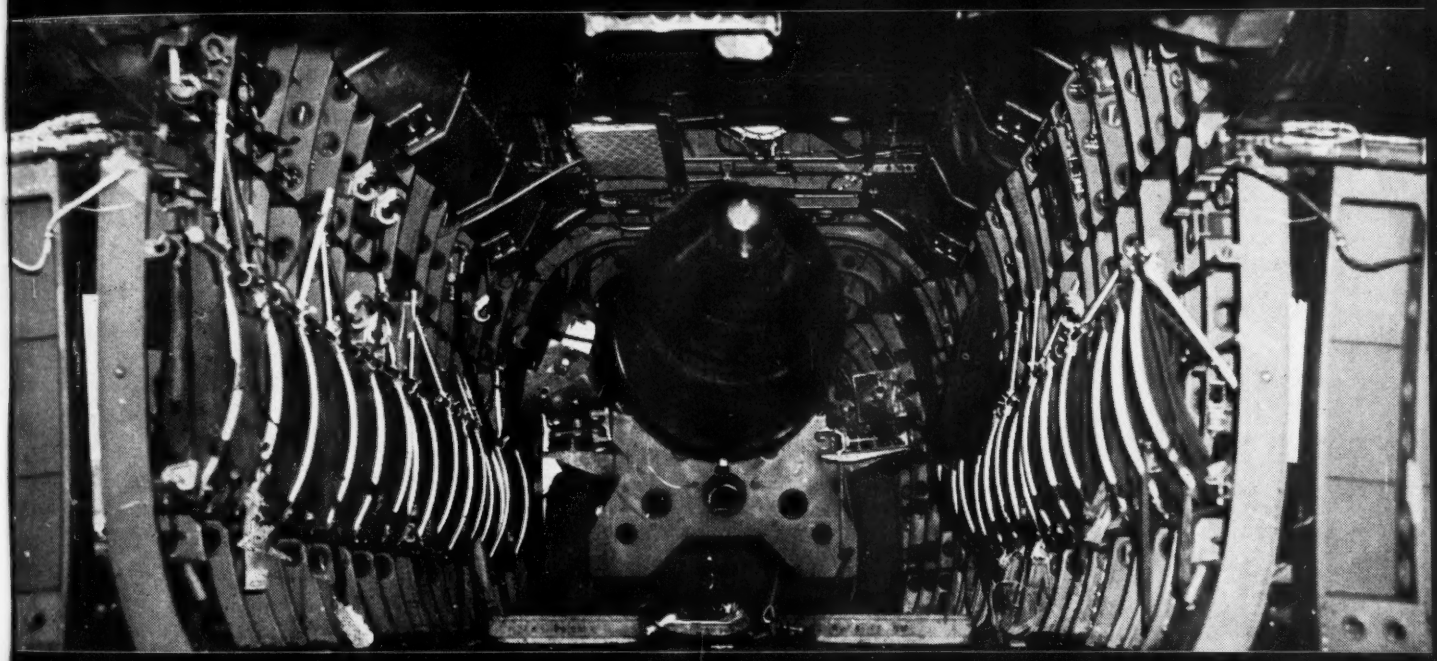
MAY 1961

UNITED STATES ARMY AVIATION DIGEST



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United States Army

AVIATION DIGEST

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MAY 1961
VOLUME 7
NUMER 5

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Beginning In July . . .

U. S. Army Aviation Digest

Annual Writing Awards

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The U. S. ARMY AVIATION DIGEST is an official publication of the Department of the Army published monthly under the supervision of the Commandant, U. S. Army Aviation School.

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

Manuscripts, photographs, and other illustrations pertaining to the above subjects of interest to personnel concerned with Army Aviation are invited. Direct communication is authorized to: Editor-in-Chief U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Alabama.

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The printing of this publication has been approved by the Director of the Bureau of the Budget, 22 December 1958.

Views expressed in this magazine are not necessarily those of the Department of the Army or of the U. S. Army Aviation School. Unless specified otherwise, all photographs are U. S. Army.

Distribution:
To be distributed in accordance with requirements stated in DA Form 12.

Above the Best -- Behind the Rest

Colonel Allen M. Burdett, Jr., Inf

IN 1963 THE Nogoodnicks attacked along the Lower Slabovian border and invaded the peace loving nation of Amabala. This so incensed the good members of the United Nations that a long debate ensued. In the end, however, right won out, and an expedition was launched to drive back the big, bad Nogoodnicks and restore peace and happiness in the pleasant peanut patches of Amabala. This is why the 30th U. S. Army (including 1st Corps, which included, of course, the 20th Infantry Division) went to Amabala.

Although both sides lugged sizeable quantities of big and little "Nukes," thus far they have not been used in the conflict. And since the Nogoodnicks are known to have copious batches of bugs and chemicals, the UN forces have announced a policy of instant retaliation. Nevertheless, with the active use of only conventional munitions, the 2d International Police Action (IPA) has been bloody and grim as wars are known to be. As predicted by past military writers, the battlefield tactics have been more fluid; there has been greater dispersion between units which have demonstrated greater maneuverability. In essence, the 2d IPA epitomizes the more common concepts of the cliche "conventional war in the nuclear age."

On 4 July 1964, Maj Gen Wilt U. McMeaty arrived in the theater to take command of ACOMZ, the communications zone of the Amabalan Theater. ACOMZ was a huge but essential organization which supported all the UN Forces. Its headquarters was on the outskirts of the picturesque old city of Rekcurtrof.

General McMeaty's arrival was indeed a great occasion. Upon alighting from his L-23F at A-1 (formerly Snriac Field), he was met by a throng of over 25,000 Amabalans. They were fervently singing their native song, "Eixid," waving flags, and shouting in unison, "For he's a jolly good fellow!"

Following this hearty welcome, General McMeaty was escorted to the war room of his headquarters where members of his staff inflicted upon him

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Col Burdett is Director, CDO, USAAVNS, Ft Rucker. He is fixed wing rated and instrument qualified.

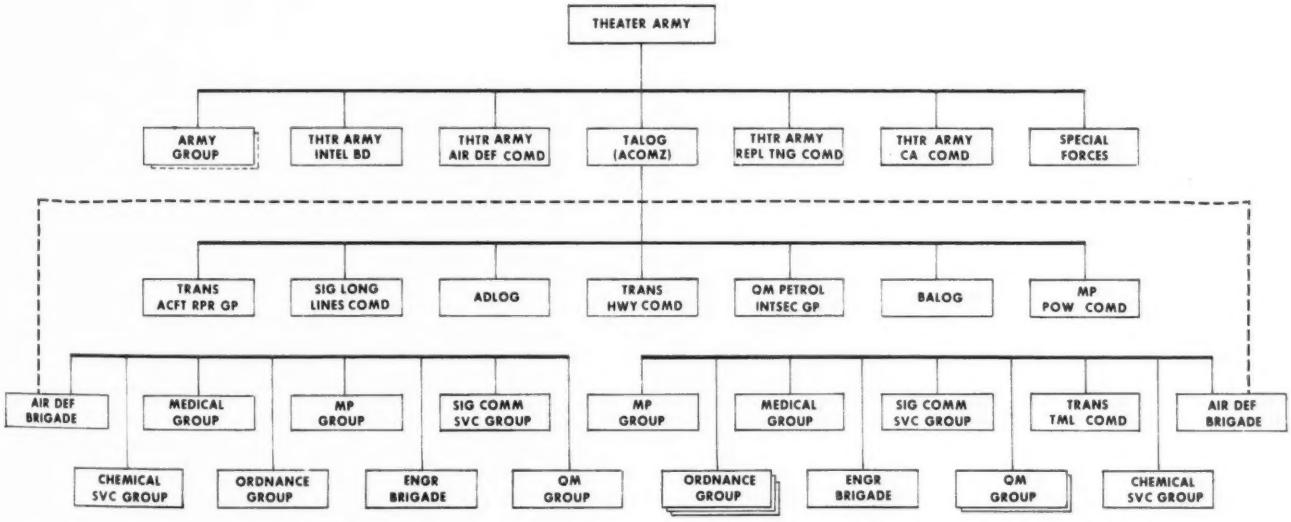


FIGURE 1-"TYPE" COMMUNICATIONS ZONE

a 3-hour briefing. Figure 1 is a copy of one of the many complicated charts which were used; it depicts the organization of ACOMZ. Throughout the briefing three points were reiterated in various ways and in varying degrees by each succeeding briefer.

The three points were:

1. ACOMZ covers an awful lot of real estate.

2. The distances between the subordinate headquarters and units of ACOMZ are indeed very great because everything is dispersed.

3. Nogoodnick gorillas, accompanied by their guerrillas, operate throughout the area. (The trained gorillas struck terror into the hearts of the peace loving Amabalans.)

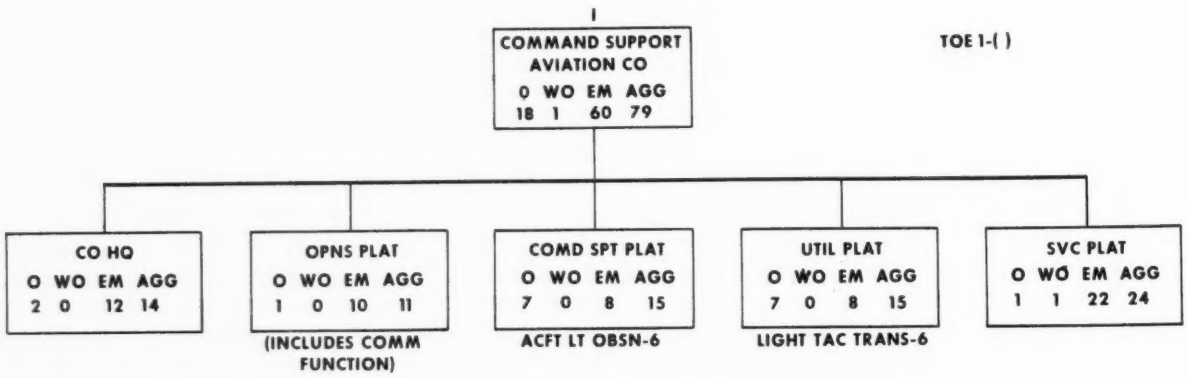
During his portion of the briefing, Col Nek E. Nosdivad, aviation officer of ACOMZ and recently nominated for a star, explained the organization, role, and mission of the Command Support Aviation Company (COSAC). Giving credit where credit was due, he pointed out that the U. S. Army Aviation School since early 1961 had advocated the employment of such a company. When the roles and missions agreement was finally modified, Army Aviation was officially allowed to operate behind the field army rear boundary. At that time, the USAAVNS proposal was adopted, and the COSAC for COMMZ's use came into being.

Concerning the Command Support Aviation Company (COSAC) (see fig. 2), Colonel Nosdivad had this to say:

"The COSAC is designed to provide immediately responsive aviation support to the COMMZ elements. Hence, a COSAC is assigned to each subordinate headquarters of ACOMZ which habitually needs such support. The COSAC, which is self-sustaining and self-supporting, can be specifically tailored by the addition of TOE 29-500 series teams to fit the individual needs of the supported headquarters and their subordinate units. In addition to providing aircraft for the movement of commanders and their staffs, the COSACs can move small specialist teams and accomplish emergency delivery of critical supplies and parts. They also assist in column control while performing radio relay missions. They can do the usual RESTA (reconnaissance, security, and target acquisition) type missions. While they have the capability for decentralized operation, they can, if conditions permit, operate from their base airfields."

At the termination of the briefing, General McMeaty thanked all of his staff for their most illuminating comments and stated that he would venture forth in the morning and see for himself that about which he had been told. He expressed a particular desire to visit the rear area security forces. This said, he and his staff repaired to the balcony for tomato juice and/or sherry before dinner.

On the morning of 5 July the



THIS IS A SKELETAL UNIT DESIGNED TO PROVIDE MINIMUM SUPPORT TO A MAJOR HEADQUARTERS AND VARIOUS SUBORDINATE ELEMENTS. IT MAY BE AUGMENTED BY ADDING ADDITIONAL FLIGHT TEAMS AND MAINTENANCE ELEMENTS AS REQUIRED TO PROVIDE NECESSARY AVIATION SUPPORT.

FIGURE 2- COMMAND SUPPORT AVIATION COMPANY

weather was foul when Capt Beam I. Guest, Aide-de-Camp, reported to his general. "Well Beam, what's the good word this morning?" queried General McMeaty.

"Well, sir," Guest replied, "though the ceiling's low, they say we'll go. Here is a copy of the itinerary proposed for today. From here to ADLOG in Nahtod where you will be met by General Supporter and some of his people. From there we will go to Krazo, the focal point of guerrilla activity. That will put us back here at 1600."

"Fine," replied the General. "Yesterday, General Loaded, the Transportation Officer, said he would plan to meet us in Nahtod. Would you confirm that?"

"Sir, I already have. He will be there," replied the aide.

"Ah so, good show — strictly on the beam!" said General McMeaty.

Later after boarding his L-23F at A-1 the general sat with earphones affixed during the runup. Shortly he heard the smooth, clipped words of WAC Sgt Lotta Gams, assigned to the ACOMZ AATRI Company. "AATRI clears Army 31964 to A-16 via —" at which time General McMeaty registered a perplexed frown.

When Lt H. P. Flywell had completed the read-back of his clearance, the general pushed the button and said, "Flywell, what's with this AATRI business? I've heard ATC before but never AATRI."

Replied Flywell, "Sir, the only time we have to go through that routine over here is when we are filing for instruments — same as back in the States. But regarding AATRI, this stands for Army Air Traffic Regulation and Identification. An AATRI company is authorized for each field army and TALOG [see fig. 3]. We have ours and 30th Army has theirs. The AATRI company does for us what ATC did in the States, plus more. It coordinates and expedites the flow of all Army aircraft throughout the entire ACOMZ area under **all** flight conditions. In addition, an AATRI company assures the identification of all aircraft using the system. Another point, it's the outfit that gives us our air warnings and provides other inflight assistance. All of this, of course, is tied in with the Air Force system which our system augments. To work properly, an AATRI company maintains continuous coordination with both the Air Force and the Theater Air Defense Command."

"Well," replied General McMeaty, "that's a very interesting fill-in. Tell me, how did this business get started?"

"Sir, it goes back some 4 years — actually the first proposal along this line was made to CONARC by the Aviation School in late 1960. The setup we have here in ACOMZ is essentially what was originally proposed. Our AATRI company mans and operates the navigational beacons which, in effect, mark our low-frequency airways. In addition, the company runs the flight operations centers which are somewhat comparable to the ATC centers back in the States. The 30th Army is using the PFNS (Position Fixing and Navigation System) for direction finding; this gives them considerably more flexibility in their flight planning than we have. Our AATRI company will change to it when more equipment becomes available."

"Ah so, good show," replied McMeaty as they sped along in the soup over the beacons which had been installed and were then being operated by men from the ACOMZ AATRI company.

After shooting a GCA at A-16, McMeaty, Guest, and Flywell landed and were met by General Supporter, General Loaded, and others. General McMeaty greeted his trusty brigadiers with a resounding: "Hello, Ace, and greetings, Mighty; it's good to see you again!"

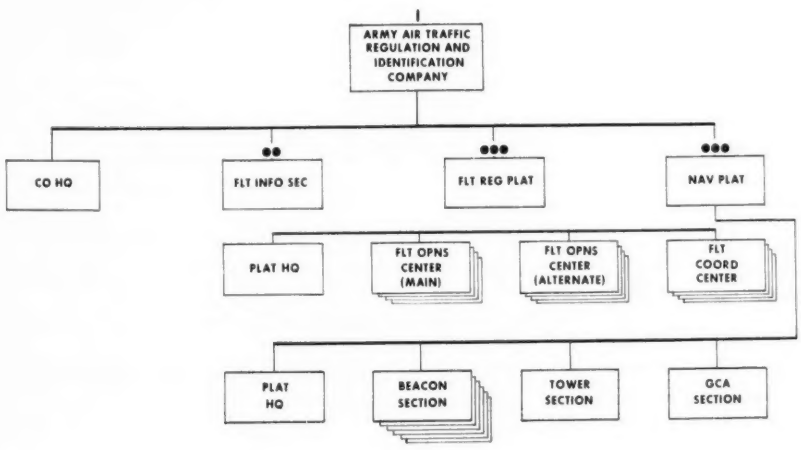


FIGURE 3- ARMY AIR TRAFFIC REGULATION AND IDENTIFICATION COMPANY

Subsequently, in a conversation with General Loaded, McMeaty was heard to say: "Mighty, what's the lowdown on the COSAC concept as far as you are concerned? Since you operate the air lines of communication as an intersectional service, do you feel that COSAC duplicates in any way your ALOC functions?"

General Loaded replied: "Sir, I am convinced that there is no duplication. The mission of my ALOC people is exemplified by their distinguished motto: 'U call — we haul.' In contrast to this is the wide variety of missions performed by the COSAC units. As a clincher, we TC types ourselves rely on COSAC units for much support. For example, the Transportation Highway Command has its own COSAC; so does the Transportation Aircraft Repair Group. The Railway and Movement Group as well as the Terminal Command are supported by COSACs at either ADLOG, BALOG, or by your COSAC at ACOMZ headquarters. No sir, I see no duplication between the two functions — and with the distances and guerrillas as they are here in ACOMZ the increasing use of air vehicles is an absolute must."

"Thus endeth the reading of that lesson," replied McMeaty as he salted away in his memory the Loaded pearls just in case he should be confronted at a later date by a manpower survey and this question should be raised.

From Nahtod, Flywell flew well and direct to Krazo where the party was met by Col I. Killemall, the commander of the rear area security force. The colonel was accompanied by Mr. Rekrap, the recently elected mayor of Krazo. Colonel Killemall saluted smartly and reported in a forceful and determined manner while Captain Guest assisted Mr. Rekrap in filling out an application for membership in AUSA.

General McMeaty and Colonel Killemall went directly to the latter's field CP. There the general underwent another briefing. Colonel Killemall outlined his mission and the organization of his force. His pitch included the following: "Although I am making the maximum use of indigenous personnel, the hard core of my effective strength is the organization shown here [see fig. 4]. Because of a high degree of organic airmobility, this force can provide rear area security and assist in area damage control for a much larger area than could be done without the airmobile capability. The air cavalry squadron is deployed throughout the more sensitive areas of ACOMZ. With the help of local security forces from nearby service units, the air cavalry squadron normally is capable of isolating and containing an enemy threat until the main force can be committed by use of the Chinooks, the HC-1Bs, which are available on an on-call status."

General McMeaty returned to Rekcurtrof at 1600 as scheduled. As he lit up his stogie on the drive home from A-1, he was well satisfied. Insofar as he could see, all was right with ACOMZ. And furthermore, what was more important, McMeaty felt that he was well equipped to deal with his old classmate, Maj Gen Mark Emdown, the Theater Comptroller. In this regard, McMeaty said to Guest in a voice filled with emotion and conviction, "By george, Beam, I am convinced that I can beat any manpower survey that General Emdown may send down."

* * *

Now every story is supposed to have a moral. The moral of the foregoing fantasy is old and simple: PRIOR PLANNING PREVENTS POOR PERFORMANCE.

The Combat Developments Office of the U. S. Army Aviation School has produced the basic planning upon which the concepts outlined above are based. This planning took the form of another formal study

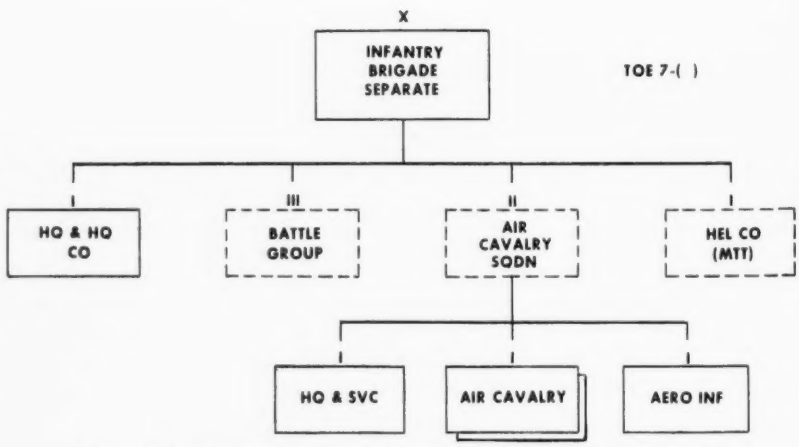


FIGURE 4: SECURITY ELEMENT MA' BE TAILORED TO MEET SECURITY REQUIREMENTS

directed by Headquarters, U. S. Continental Army Command. It was approved and forwarded to USCONARC in January 1961.

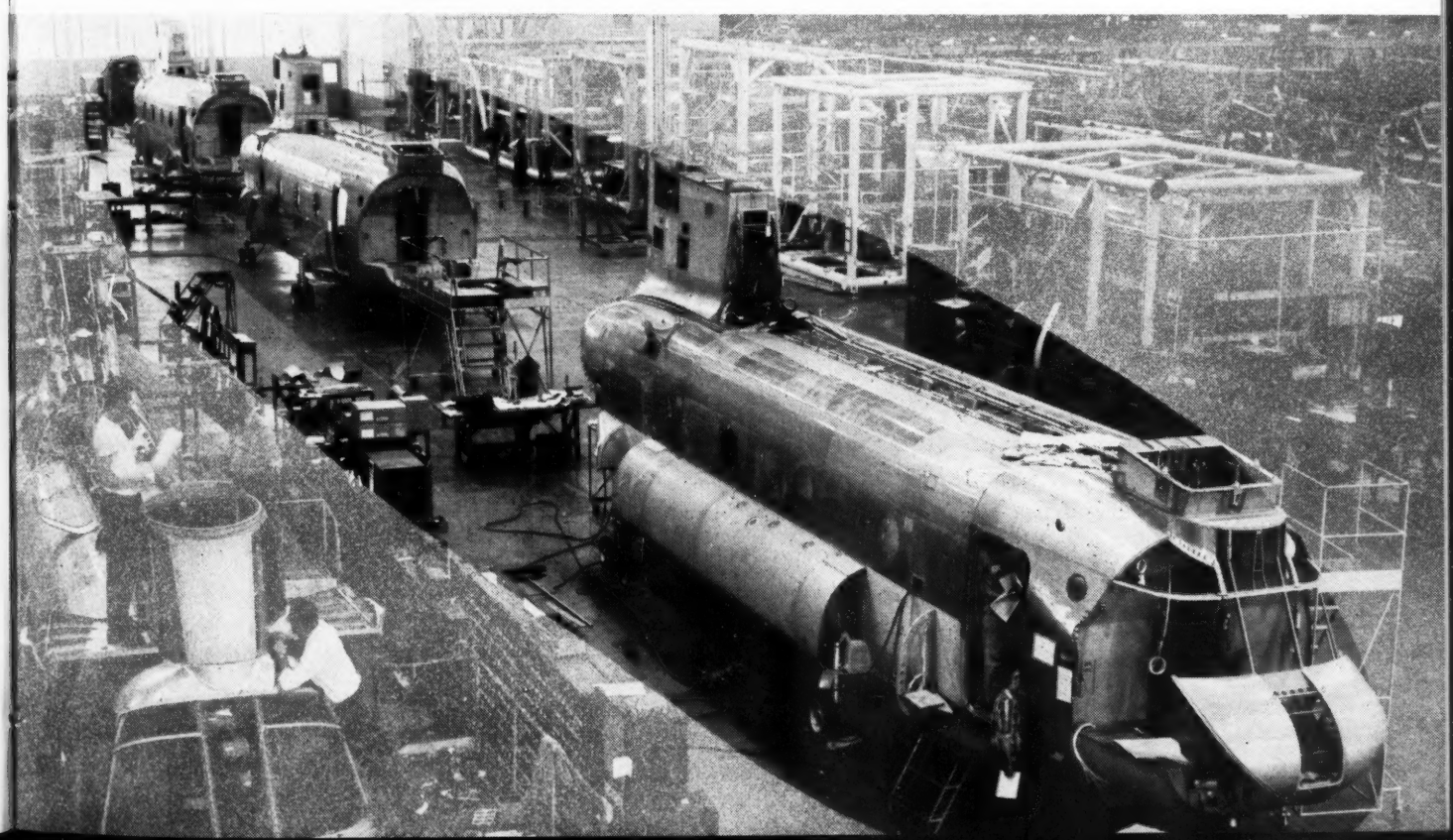
The title of the study is "Employment of Army Aviation in Areas to the Rear of the Field Army." The study outlines the qualitative and quantitative requirements for Army Aviation in the communications zone exclusive of the air lines of communication. The ALOC was not considered since this requirement currently is being studied by the Transportation Corps School.

As indicated above, our CDO study deals with the organizational and operational concepts within the communications zone. It encompasses the need for COSAC units, a rear area security and area damage control force, and also the AATRI company. The study determines aviation requirements for COMMZ and recommends how they can be met. The need exists. It can be met. Army Aviation must support forces in rear areas as well as those in the combat zone. We must fly above the best, behind the rest. □

YHC-1B Chinooks On Production Line

Shown below are the first three YHC-1B Chinooks for the U. S. Army. Maximum gross weight of the Chinook is 33,000 pounds and fuselage length is 51 feet. The Chinook was selected by the Army after a design competition for a helicopter able to carry 2 to 3 tons of payload on 100-mile radius Army missions under hot-day conditions and more than 7 tons maximum payload. The Army has since ordered a total of 28 Boeing Vertol HC-1B Chinooks, with the first five designated YHC-1Bs to denote their role as development aircraft.

The Chinook is powered by two 2,200 shaft horsepower Lycoming T55 turbines, giving it a cruising speed of 150 miles per hour. The Chinooks have straight-in rear loading ramps and production sealed fuselages, giving built-in flotation capability that makes it possible for them to land in water. Delivery will begin later this year.



what well dressed pilots ~~will~~ *should* wear...

Captain A. A. Bezreh, MC

WHAT IS THE attitude of most pilots toward safety equipment? The most common answer is mixed in feeling. The pilot says, "I believe in the seat belt and the shoulder harness. And the helmet is a good thing, although it gets pretty uncomfortable sometimes." But there's more to this than meets the ears. Anyone interested usually doesn't have to go much out of his way to see that many aviators have a fairly callous attitude when it comes to putting their mouthings into practice. Too many a helmet rots in a locker while its owner "tools around in the blue." Just recently an accident investigation revealed that the pilot of a helicopter lost control and crashed when the buckle of his unfastened seat belt became caught under his collective. This unfortunate pilot never had the opportunity to regret his mistake.

There are many people in the Army right now who spend their workdays scratching their heads wondering how they can get aviators interested in saving their own lives. After developing, evaluating, producing, and distributing safety equipment, the toughest job of all then comes up: selling the idea of using it to the aviators.

Now pilots aren't really any more derelict regarding safety than the population at large. It's just unfortunate that the

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Capt Bezreh is a graduate of the Flight Surgeon's Course at Brooks Air Force Base and is currently assigned to the Human Factors Section of USABAAR.

human beast in general is not concerned about safety. For instance, consider that it has been known for years that seat belts in automobiles would prevent about 50 percent of the fatalities resulting from auto accidents. And, although every automobile manufacturer in the country has offered to put seat belts in their cars, nobody wants them.

Let's look at some hard figures which show how aviators fared who did and did not wear the crash helmet. During a 3-year period, Army Aviators who were not wearing helmets received 39 fatal head injuries and 129 additional serious head injuries. During the same 3 years, aviators who were wearing helmets received only 15 head injuries, 13 serious and 2 fatal. Flight surgeons reported that head injuries were prevented by the helmet in 143 cases and that more serious head injuries were prevented in 13 cases. You can't argue with figures like that. But, the helmet won't help a bit unless it's on the head and strapped firmly.

The seat belt and shoulder harness statistics would tell the same kind of story. The principle on which they work is simple enough. They allow the pilot to participate in the deceleration of the aircraft during a crash. Picture a man with a raw egg in his hand, facing a concrete wall. Now picture him making a motion as if to throw the egg at the wall, while holding onto the egg. The egg remains unharmed. Then, he makes the same motion, this time letting the egg go . . . what a mess! The first time the egg had on its seat belt and shoulder harness.

What makes it so important that the Army Aviator gives himself a break is that the crash forces produced in most Army aircraft accidents are within the limits of human tolerance. The seat belt and shoulder harness are the leashes through which these forces must be controlled and dissipated. Otherwise, they will do the damage of a herd of wild horses.

Finally there is the problem of clothing. It only stands to reason that a pair of boots would help the feet and ankles more in a crash than a pair of low quarter shoes. It doesn't take an Einstein to see that the singeing flames of a postcrash fire will cause less severe burns to a pilot wearing proper clothing and a pair of gloves than they will to one wearing only a short-sleeved shirt and short pants.

Of course, pilots traditionally are supposed to have a sort of cavalier outlook on life. Maybe they resent having to be the belt and suspenders type. But, 'tis better to wear belt and suspenders, than to wear no pants at all. □

Where There's A Will, There's A Way

Demonstrating an immediate and practical application of the work simplification program and the do-it-yourself principle, medics at the 47th Air Ambulance Platoon, Fort Ord, Calif., are now carrying out their mission with greater facility and under safer conditions.

H-19 pilot, Lieutenant Floyd L. Coddington, decided it was an unnecessary inconvenience for four men to haul the air compressor from the hangar out to the aircraft on the landing strip whenever a tire was low on pressure.

They obtained a salvaged warehouse cart and made a couple of minor modifications on it in the machine shop. The unit now has a means of hauling the heavy compressor about which requires only two men, requires considerably less energy, and affords much less chance for injurious accidents.

The other progressive step in work simplification was sparked by medical aidman Specialist 5th Class Robert W. Williams, and also involves use of an altered cart. This alteration was made to avoid the inconvenience of lugging about the heavy (70 pounds) aircraft mechanic's toolbox or the heavy aircraft jack. He obtained a salvage commissary cart and had it fitted out to carry the toolbox, jack and other needed equipment. Once in the cart, the tools are more easily reached, eliminating the need to stoop or squat.

* * *

Has an article in the DIGEST helped your unit perform its mission more effectively? Has an idea in the DIGEST aided you in solving a problem of safety in your unit? We want to hear about it. We want to print YOUR article and YOUR idea. With over 9,000 copies now being printed, your contribution will reach a larger segment of ARMY AVIATION than ever before. Let us hear from you muy pronto.

Artillery

Rugged, Reliable Aircraft Needed for Survey, Target Acquisition, Conduct of Fire

ALL CONSIDERATIONS regarding the introduction of new aircraft into the Field Artillery must meet the requirements of the Field Artillery weapon system.

The Field Artillery weapon system consists of those components necessary to accomplish the Artillery mission:

- weapons and fire control equipment,
- target acquisition,
- communications,
- survey,
- ballistic meteorology,
- transportation (ground and air), and
- logistical support.

Elements of the weapon system must be immediately available and responsive to the weapon system commander (a supporting Field Artillery commander, for example). This concept prescribes that aircraft be assigned organically to the Artillery commander ("aircraft" being the vehicle, its pilot, sensory devices, and associated equipment).

All combat arms require the use of Army aircraft for command and control, reconnaissance, communication, liaison, and logistic support. Because of its mission the Artillery has certain requirements not common to all the Arms. These requirements for Army aircraft are

- rapid extension of survey control,
- conduct of fire,
- target acquisition.

Present doctrine of the United States Continental Army Command (USCONARC) holds that aircraft should be assigned at the lowest level which can justify organic aircraft from these standpoints:

- habitual need,
- requirements for responsiveness,
- maintenance capability,
- availability of aircraft auxiliary equipment.

At the present time division aircraft are consolidated in aviation companies to increase flexibility and achieve economy in numbers of aircraft. When Army aircraft become more rugged, easier to maintain, and simpler to operate, it is expected that they will be assigned organically at lower levels.

The U. S. Army Artillery and Missile School bases its position upon the USCONARC criteria. To provide the Artillery commander the responsive means to accomplish his mission, Army aircraft must be organic to all field artillery organizations habitually requiring them. These organizations include:

- Headquarters and headquarters battery of each field artillery group, missile command, and division, corps, and army artillery.
- Headquarters and headquarters battery of each cannon, missile, and target acquisition battalion.

The above doctrinal aspects largely determine specific materiel requirements. Field Artillery requirements for aerial vehicles are based upon those functions allocated to Army Aviation by Department of Defense Directive and spelled out by Army Regulations. The role of the United States Army Artillery and Missile School in the development of Army Aviation is primarily that of a combat arm whose cooperation is sought. On a cooperative basis it works with the Aviation School which is most directly and broadly responsible.

The Artillery School reviews and comments on various Aviation School and Transportation Corps studies and papers, providing the Artillery viewpoint. This procedure has historical precedent owing to the prominent role played

by the Field Artillery in Army Aviation during World War II.

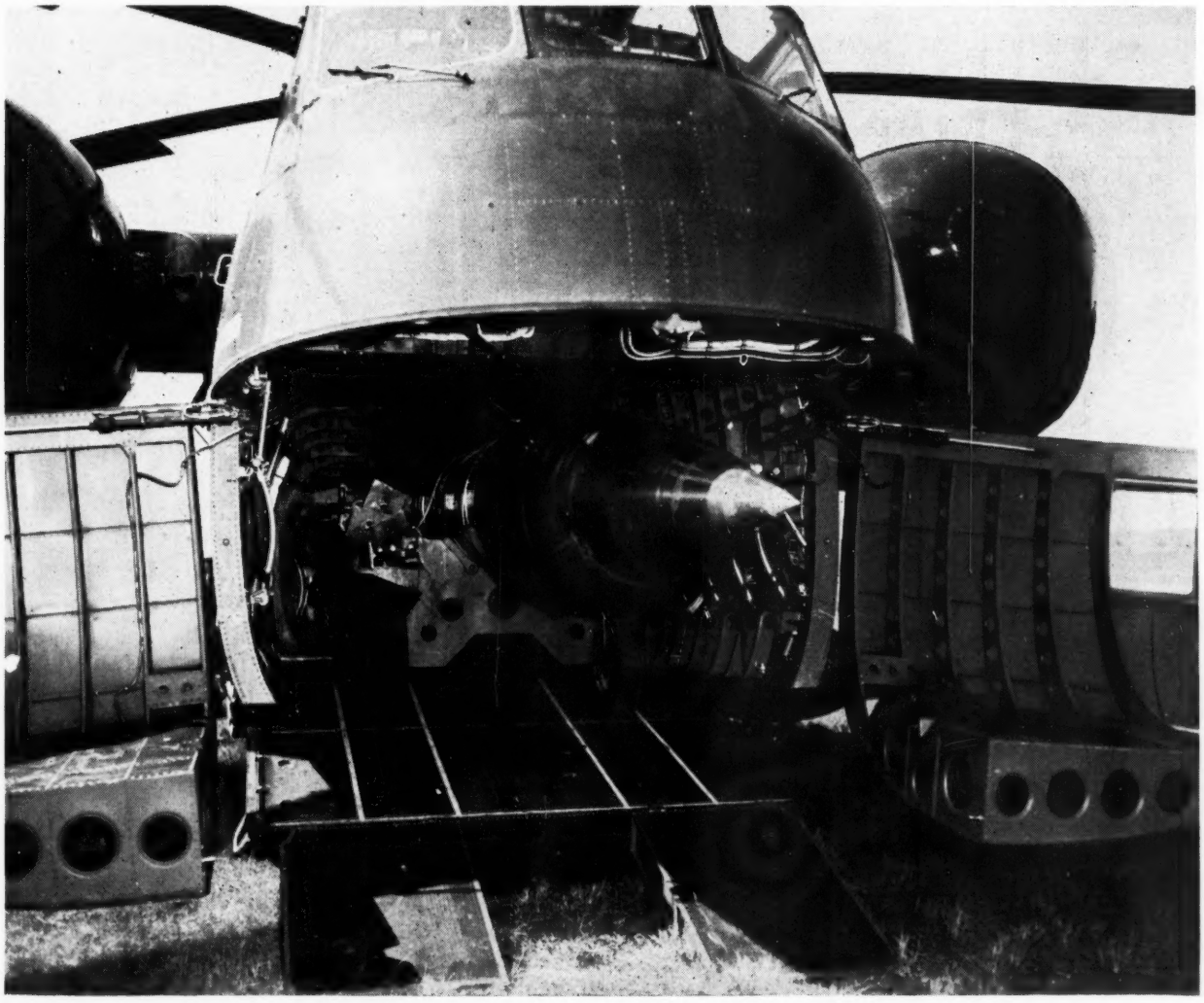
The Artillery School also conducts studies to establish and support Artillery doctrinal and materiel concepts. These studies provide USCONARC and its subordinate agencies with the current artillery requirements and views.

The Artillery School occasionally participates in ad hoc committees and conferences which study doctrinal policy and materiel concepts and proposals. Frequently airframe manufacturers visit the Artillery School at Fort Sill to present concepts at varying stages of development. These range from initial engineering concepts to prototype aircraft.

Commonly-cited reasons for pooling aircraft at division or other levels are to facilitate maintenance, provide for flexibility of operation, and achieve economy in numbers of aircraft. These advantages are actually realized. However, it would be more appropriate to assign aircraft based on the tactical necessity of the units habitually requiring them.

It would then be necessary to provide the using units (e. g., battalions) with the trained personnel and equipment needed for the maintenance mission. Although this procedure may be more expensive in terms of men and materiel, consideration of the mission is, or should be, the overriding factor. As indicated, there is a clear need to design aerial vehicles possessing ruggedness and reliability with a simplicity of operation and organizational maintenance. These **qualities must be inherent in the aircraft and achieved by following precepts established in the initial design.**

Field artillerymen use aerial vehicles to accomplish many other tasks. They are used to establish artillery communications, which includes laying field wire and performing radio



relay. Another common use is for short distance helicopter transport of survey crews to speed up survey by conventional techniques. Other uses could be listed. Those additional missions on which the field artillery profitably employs Army aircraft provide **added** reasons for organic aircraft at using level. These auxiliary uses likewise indicate a requirement for the design of the aerial vehicle to provide built-in characteristics enhancing its flexibility in employment.

Probably the most difficult problem facing the Army today is target acquisition. The tool most useful to the artillery in detecting, identifying, locating and destroying targets is Army aircraft. It provides an elevated mobile observation post for observers and transports the many types of sensors now being developed.

In just about all sensory fields there are one or more applications providing for equipment to be mounted in an aerial vehicle. Numerous sensors are in varying stages of development. These include:

- side looking airborne radar (SLAR),
- conventional cameras,
- television cameras,
- infrared devices, and
- optical devices.

These systems will include various combinations of communications and data link devices. Optical devices include the visual airborne target location system (VATLS). This is first-generation equipment which will permit an airborne observer to locate targets accurately in three dimensions.

Operational aircraft are being modified to accommodate these systems on a somewhat makeshift basis. The design of future aircraft must provide facilities for the proper mounting, employment, and maintenance of the various sensors. This can come about only through detailed, precise statements of military characteristics which consider artillery needs. This must be followed by all elements of the development program, giving careful consideration to all required characteristics.

The missions of each type artillery unit determine its aircraft requirements. This can be illustrated by using as an example a field artillery battalion employed in the close sup-

port role. The battalion commander is not only concerned with the real estate for which the supported infantry commander is directly responsible, but with the terrain to a depth of 10,000 meters into enemy territory. This artillery battalion commander must have within his unit the means to provide continuous communications, target acquisition, reconnaissance, and logistical support necessary to accomplish his mission.

The problem is to determine the numbers and types of aerial vehicles required, particularly for the most important of missions, target acquisition, and adjustment of fire. To be immediately responsive to the artillery commander the target acquisition aerial vehicle must:

- Be located near its parent artillery unit.
- Be capable of operating from unprepared strips or pads.
- Have the qualities of ruggedness, reliability, simplicity, and ease of maintenance.
- Be especially suitable for visual observation.
- Provide a high degree of maneuverability to permit effective evasive action.
- Be able of carrying a pilot, observer, communications equipment, optical (visual) version of the airborne target location system (VATLS), and fuel for at least 3 hours of endurance at speeds of from 75 to 150 knots.

As a member of the artillery air observer team, the artillery pilot is required to place the observer in the best possible position to search for targets and adjust fire, to watch for hostile aircraft, and on occasion to observe and adjust fire himself. Therefore, the vehicle must be simple to fly and be relatively stable.

The present requirement for visual operations does not require all-weather instrumentation or flight. The general characteristics outlined for a light observation aircraft (LOA) indicate a vertical takeoff and landing (VTOL) type. The VTOL type would be more desirable from the standpoint of weather, enemy antiaircraft capabilities, and proximity of the aircraft to the artillery battalion. However, the current complextiy of VTOL aircraft and associated maintenance difficulties remove it from consideration at this time for assignment at battalion level.

Pending development of a VTOL aircraft with a comparable reliability, the STOL type must receive primary consideration for the target acquisition role in the close support field artillery battalion. The number of such aircraft required would be based upon such considerations as:

- comparison between pilot fatigue and requirement for continuous surveillance,
- the requirement for the performance, sometimes concurrently, of the other missions of reconnaissance, command liaison, etc.

We may similarly determine the aerial vehicle requirements of all other types of artillery units in the present time frame (1961-1965) and in the long-range time frame (1965-1970). Such a statement would present **all** artillery requirements for aerial vehicles for the foreseeable future. The United States Army Artillery and Missile School has such a statement on record with USCONARC and the other Service Schools. This classified position is not included here, but is available from appropriate Combat Development personnel.

Future artillery methods of employing Army aircraft depend upon future doctrine and the resultant new organizations and tactics.

Some new concepts provide for airmobility of all weapon system elements in Army aircraft. Current helicopters are being employed to transport conventional artillery in support of airmobile operations. The artillery has a requirement to include a suppressive fire kit on observation aircraft. Such a kit will permit the aircraft to operate where it would otherwise be denied access by enemy ground fire. The extension of the concept of employing Army aircraft as a weapon platform for support artillery is receiving considerable attention and study.

The degree to which the Artillery can influence the developmental trends for Army aircraft appears to be limited. The Artillery's wants are being made known by coordination with appropriate agencies such as the Army Aviation School.

The future of Army Aviation is bright. Its role in contributing to the accomplishment of the Artillery mission is continually increasing in importance. The United States Army Artillery and Missile School is confident that Army Aviation will make a significant contribution to future success upon the battlefield.

THE PREVARICATOR

Captain Ira L. Laney, SigC

IT IS inconceivable that a well trained, experienced aviator would deliberately fly below the tops of prominent terrain features under instrument conditions. Nevertheless, this does occur; consequently aircraft occasionally encounter mountains. Normally this occurs only once per flying career for the aviator directly concerned, and gives rise to the following questions from his contemporaries: "Did he have the current altimeter setting?" or "Was he off his altitude?"

As we always let George do it, let's assume that George was an Army Aviator who encountered a mountain in flight. George isn't with us to answer any questions. But we can analyze some of the facts and fiction surrounding the use of the pressure altimeter in an attempt to determine where he erred.

Except when an aircraft is on the ground with the current altimeter setting (K factor considered 0), it is very rare for the altimeter to indicate true altitude. The error between the indicated altitude and true altitude is usually small, but on some occasions, even at comparatively low altitudes, the amount of error can be astounding. The pressure altimeter, correctly set, is good for flight level separation because any atmospheric error is common to all pressure altimeters in the area. It is also useful in landing, at which point the altimeter error diminishes to zero, but as George now knows, the pressure altimeter will not indicate true altitude while in flight.

Here are three theories generally accepted as facts that may be pure fiction:

1. The pressure altimeter will indicate approximately true altitude if the current altimeter setting is maintained.

2. A flight into a surface high pressure system would cause the aircraft to be higher than the indicated altitude.

3. True altitude may be computed in flight by correcting for flight level temperature.

If we study the pressure altimeter from a slightly different approach, we can determine why these three supposed facts are fiction, and thus be ready to cope with any large discrepancy between indicated altitude and true altitude.

What determines the indications of the pressure altimeter? Here are the facts; there are only three variables:

1. The atmospheric pressure which the instrument is measuring.

2. The mechanical displacement of the indicator needle — the altimeter setting.

3. Instrument error. This must be corrected on the ground so will be considered zero for this flight.

Disregarding instrument error, it is easy to determine the effect of the first two variables. Information necessary for determining the effects is available in the weather station. By asking for two specific items of information during the preflight weather briefing you can determine whether you will be flying at an altitude higher or lower than indicated altitude and by approximately how many feet.

First, you will want to know if the pressure levels in your proposed flight area are above or below standard and the amount of variation. The forecaster can give you this information by referring to the Constant Pressure Charts. These are charts that are prepared for various pressure levels and show the conditions existing on an isobaric surface; that is, everything on these charts was determined for the same pressure level.

Let's consider George's flight in which he was anticipating a flight at 10,000 feet. Had he asked the forecaster to check the 700 mb Constant Pressure Chart (this chart is plotted at 9,900 feet MSL in a Standard Atmosphere) he would have found that the 700 mb level was lower than standard, actually down to 9,000 feet MSL. We can see that his true altitude was as much as 900 feet below his indicated altitude had the altimeter setting been standard or 29.92 inches Hg.

George should have considered the altimeter setting for the area which was running up to 31.02 inches Hg. (31.30 inches Hg is the highest ever recorded in the United States.) Because of this the 700 mb level was only 9,000 feet above a sea level pressure of 31.02

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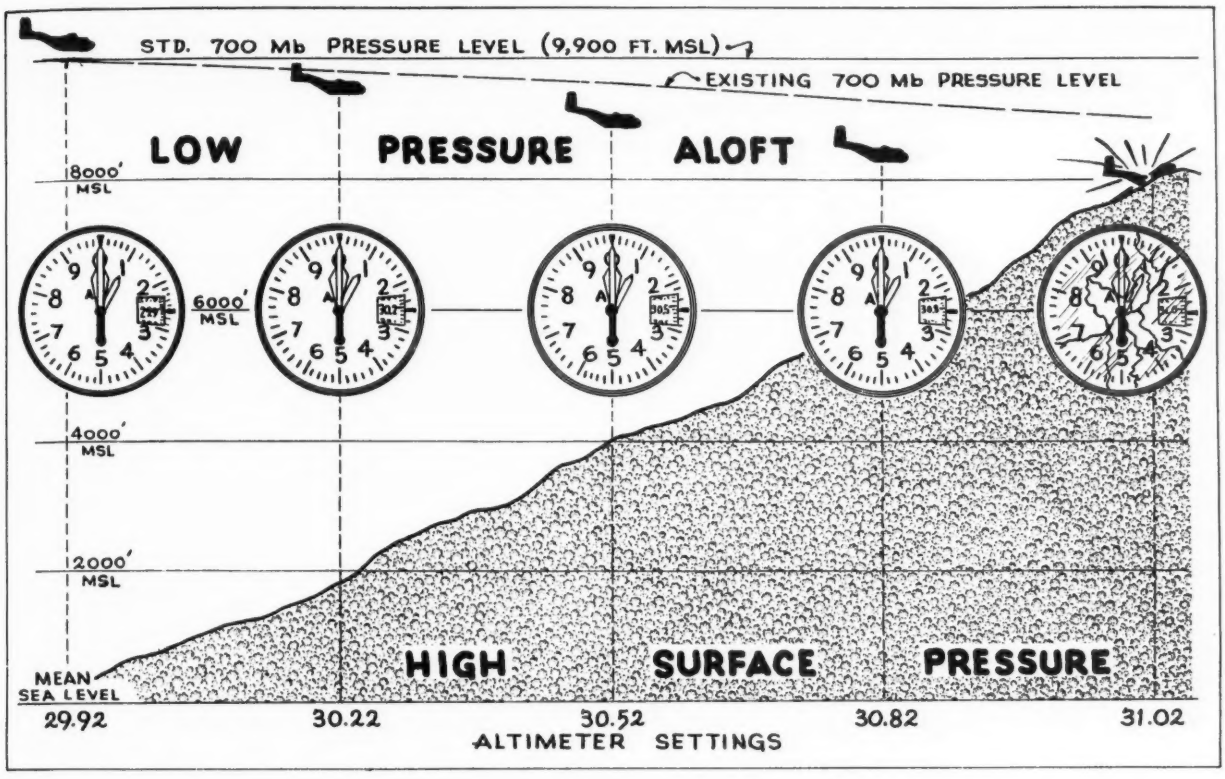


inches Hg instead of 9,900 feet above the standard sea level pressure of 29.92 inches Hg. This means that the vertical pressure gradient was much greater than normal, to be exact 1.10 inches Hg more decrease in the lower 9,000 feet than in a Standard Atmospheric condition.

Considering the high altimeter setting (31.02 inches Hg), it would be logical to assume that the 700 mb Constant Pressure Chart would be approximately 1,100 feet above normal. In this instance, however, the 700 mb level was 900 feet lower than standard, so we add the two effects to determine the total error.

Flight level pressure (low)	900 feet
Altimeter setting (high)	1,100 feet
Total error	2,000 feet

George planned his flight to maintain an indicated altitude of 10,000 feet; his true altitude was very close to 8,000 feet. Oops.

Did he have the current altimeter setting? Absolutely.

Was he off his altitude? No.

Facts and fiction. George and his flight are completely fictitious. Fact: the cited pressure situation was an actual observed condition existing on the surface weather maps and Constant Pressure Charts for 24 Jan 61 and is neither outstanding nor unusual. Phenomena of this sort have been recorded that have created altimeter errors which have placed the indicated altitudes in excess of 2,000 feet above the true altitudes. Fact: flying in an area of high station pressure (altimeter setting) combined with a low pressure at flight altitude, especially in mountainous terrain, creates a hazardous condition if these factors are disregarded.

How can we eliminate this hazardous condition when flying in a mountainous area? Let's do it by the numbers:

1. Consult the Constant Pressure Charts for the route of flight. If these surfaces are lower than standard for the levels checked, you will be flying at an altitude lower than the indicated altitude.

2. Check the altimeter settings for stations along the route of flight. If the altimeter settings are higher than standard and the situation exists cited in the preceding paragraph, PLAN and THINK.

3. PLAN your flight and file for an altitude that will definitely afford required obstacle clearance.

4. THINK: **Never** accept a clearance at an altitude that may jeopardize your flight.

5. REMINDER: You will fly indicated altitudes with the current altimeter setting when operating below 24,000 ft. This ensures separation from other aircraft. □

Quartermaster Corps

Direct Support to Army Aviation

THE QUARTERMASTER Corps' role in Army Aviation is voluminous. For example, the Army Aviator is clothed, fed, and sheltered in the field by items developed and furnished by Quartermaster. To narrow the scope somewhat this article will be confined to Quartermaster direct support of Army Aviation.

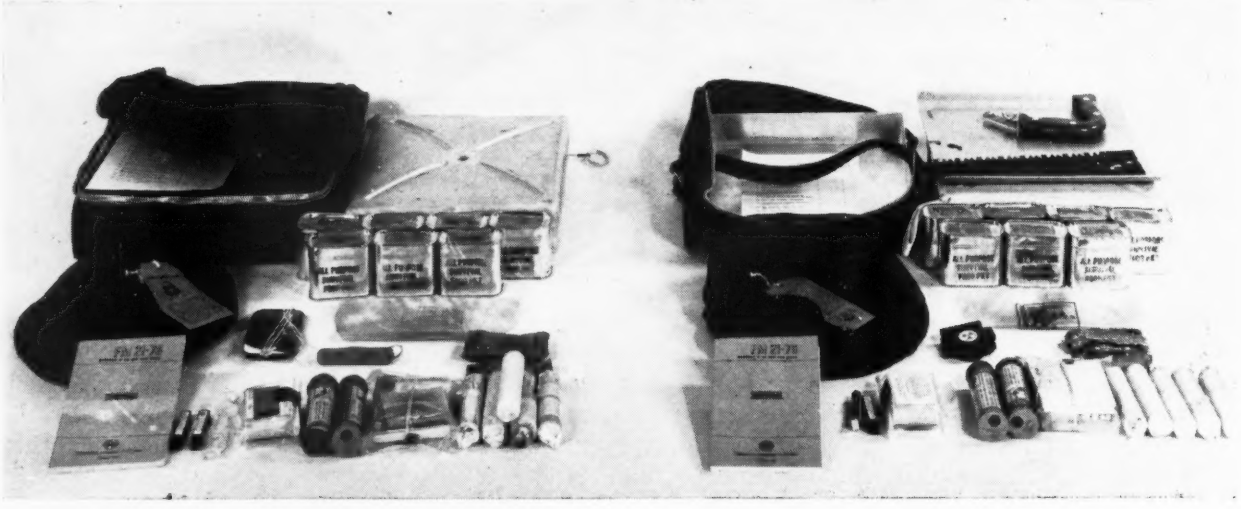
Army aircraft have operated in cold and hot climates and over mountains, deserts, and jungles for many years. They will continue to operate in these areas and climates—also over large bodies of water and in regions of the temperate zone, where large uninhabited areas exist. Improvised survival kits are being used by Army Aviators in flights over these areas. This is unsatisfactory since the content, makeup, and location of the kits vary with each aviation organization.

Survival kits now in development will give the downed aviation crew member a means for survival and the aids to search and rescue necessary in the particular environment of his operations. By the use of standard kits, training can also be standardized, making the entire survival program more effective.

Three kits are being considered: cold climate (see fig. 1), hot climate, and overwater.

Each kit will consist of two containers holding the supplies required to facilitate survival and rescue for two persons, such as a compass, first aid kit, survival rations (including the new All Purpose Survival Ration), water supply, flares, etc.

Figure 1. Components of cold climate survival kit



The maximum weight of the kit will be 52 pounds.

Supplies in the cold climate, hot climate, and overwater kits vary according to the demands of the environment. For example, the cold climate kit will contain two sleeping bags, while the overwater kit will contain two liferafts and a system for their quick and positive inflation. The cold climate kit will contain more food than the other two kits. Water will be emphasized in the hot climate kit, and a means for desalting sea water will be emphasized in the overwater kit.

Each kit can be broken down into two containers of equal size to enable bailout (fig. 2) or carrying overland. Kits will be stowed in the aircraft where they will be most accessible during an emergency.

The area of protection in Army aircraft has been a source of controversy for some time due to the weight penalties incurred by the addition of armor. It is a complex problem. Proposed protective solutions range from those of evasive maneuvering to concepts of flying tanks. The problem is even more complex when considering current inventory aircrafts. Their possible modifications for protection are extremely limited. In any event, the purpose of providing protection is to allow a maximum use of organic Army aircraft in their assigned missions, while sustaining a minimum of losses due to enemy action. The answers to these problems lie in many areas of Army activity.

Currently a USCONARC intertechnical service working group (under the auspices of the Transportation Corps) is studying the protective needs of Army aircraft and aviation crew members. The coordinator of this group is a member of the Systems Research Section, Psychology Branch, Environmental Protection Research Division of the Quartermaster Research and Engineering Command. The group's cooperative effort is aimed at pooling the knowledge of these technical services to coordinate and consolidate research for an optimum protective system for aircraft and crewmen.

Kit designs for some existing aircraft have been completed which will provide crews protection from ground small-arms fire. Kit weight will not jeopardize the aircraft's intended mission. These kits can be installed and removed as dictated by the flight mission. Human engineering studies are being made to determine the effects of restricting the aviator's visual field on his ability to fly the aircraft. Since flight altitudes will dictate the type of antiaircraft system to which aircraft will be exposed, human factors data on aviator and aerial-observer performance at various altitudes has been collected.

The present aviation crewman's helmet provides little ballistic protection, is barely compatible with the standard Chemical Corps protective mask and hood, and does not prevent heat stress.

The new general purpose flight helmet now under development will afford the wearer with improved crash protection, ballistic protection, comfort, and compatibility with other items of operational equipment. The problems of improved crash and ballistic protection have been solved. Work now concentrates on noise suppression and comfort of the wearer.

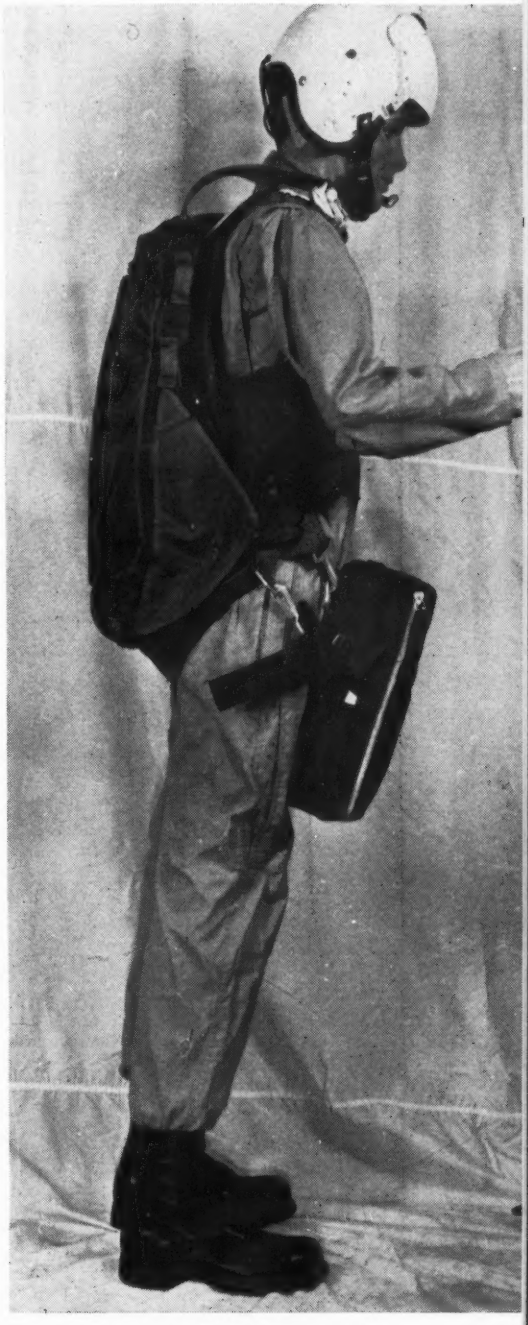


Fig. 2. Survival kit attached to aviator

The increased noise level of more powerful and complex aircraft has produced a potentially hazardous environment for aircrewmen. Quartermaster human factors specialists and helmet designers are combining their efforts to protect them

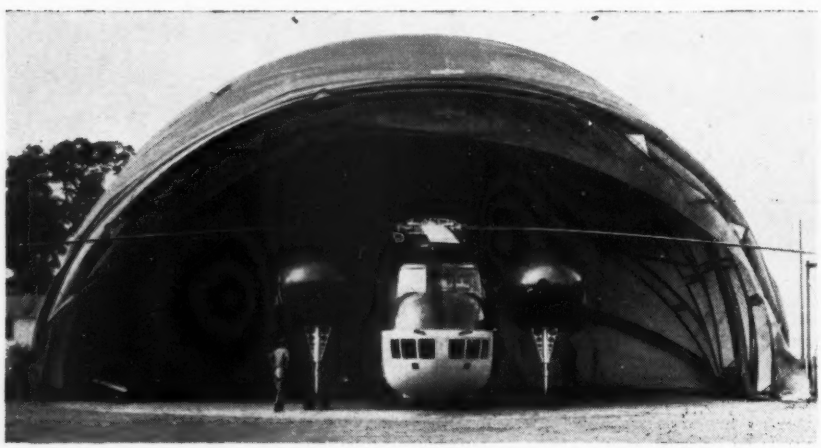
against harmful noises yet maintain a high level of reliable communication.

Quartermaster geographers are studying the relationship between quantitative terrain characteristics and the line-of-sight detectability of low-performance aircraft.

The body size of Army Aviators in anthropometric measurements is now available, the result of a recent survey by the Quartermaster Research and Engineering Command. A series of 500 Army Aviators were measured. (This represents about 10 percent of the Army Aviator population.) Forty body measurements were taken on each man, as well as weight and three skinfold thickness measurements. Data derived may now be applied in problems of design, sizing, and tariffing of flight clothing and specialized equipment. It may also be used in other areas of human engineering which require the use of body size information in aviator-equipment-aircraft systems.

Much work is being done by the Quartermaster Corps on petroleum, oil, and lubricants (POL) handling equipment for Army Aviation. New equipment is currently required by Army Aviation which will provide complete delivery systems for bulk POL products. This new equipment should augment existing and recently developed equipment. POL dispensing outfits being developed under this project implement this bulk supply concept through rapid conversion of personnel and cargo vehicles into fuel handlers. Design and fabrication of collapsible containers (ranging in capacity from 350 to 10,000 gallons), dispensing kits, tie-downs, and hardware augment these developments.

Figure 3. Air and frame supported aircraft maintenance tent, 72′ x 80′ x 37′ high



To enable such outfits to operate under Arctic conditions, new rubber and plastic materials are being investigated. Studies have been completed determining the most suitable bulk fuel container for transporting, distributing, and dispensing petroleum products in support of combat operations under all conditions of terrain and climate and systems for delivery of POL by fixed and rotary wing aircraft.

Fifty gallon per minute conversion outfits (for use with rigid or collapsible containers) are being developed for the 2½- and 5-ton trucks and M-59 personnel carriers.

Quality control of POL is also a Quartermaster responsibility. Fuel blending, measuring and gauging kits are being developed to improve quality control capabilities.

Combustion characteristics of military fuel will be tested by a recently developed COT knock testing engine. Capable of testing fuels now being tested by five standard engines (weighing 5 tons), the new engine weighs only 900 pounds.

The requirement for pressure fueling of the Mohawk and future cargo helicopters has been met by current developments. Study of operations and designs to reduce the number of standard outfits necessary

for POL handling continues.

Aids for aircraft loading, unloading, and cargo handling are in various stages of development. These items include: rough-terrain forklift trucks; lightweight conveyors; airborne outloading gantries; and expendable pallets.

Shelters for aircraft maintenance are a continuing project. Requirements must be met for small, nose-in (or umbrella-type) shelters for minor engine and rotor repairs; a medium shelter for major repairs; large shelters to accommodate more than one aircraft of different types.

Three types of shelters are currently undergoing user tests at the U. S. Army Aviation Board. Largest of the three is the field expandable aviation maintenance tent (fig. 3). A lightweight metal frame supports neoprene coated nylon fabric to form a shelter large enough to accommodate any combination of three Bird Dogs, Beavers, or Otters. This shelter will also house a Mojave. Erected by utilizing low pressure, high volume air, it is supported by a metal frame. Electric motors raise and lower the side to permit entrance and removal of aircraft.

The nose-in type portable hangar is also undergoing user test. Supported by lightweight metal frames, it can be erected by four to six men in approximately 1 hour. It will accommodate the Bird Dog, Beaver, Seminole, Chickasaw, and Choctaw.

The third shelter presently under test is a smaller version of the preceding structure. It will accommodate the Bird Dog, Beaver, Sioux, and Chickasaw. Efforts will continue to lighten and simplify such shelters. The double-walled, air-supported concept which has met with immediate success in other fields will certainly have future application in the aviation shelter field.

Recently a program has been completed to develop the air delivery capability of the de Havilland Caribou. Optimum systems for the delivery of supplies by parachute and freedrop methods were determined as well as the necessary modifications to the aircraft to accommoderate these systems. Standard air delivery equipment was used to fabricate these systems.

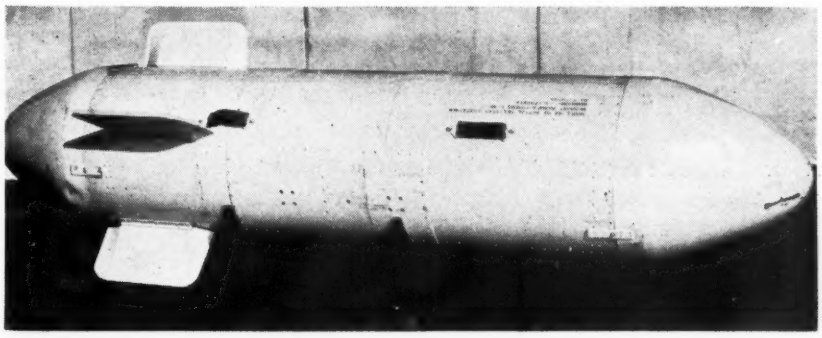
In progress is a test to determine the air delivery capability of the Grumman AO-1 Mohawk in an emergency air supply role. Supplies will be stored in a rigid streamlined container and carried under each wing. The Marine Corps developed M-4A high-speed container (fig. 4) is being used in these tests. This container has a payload capacity of 500 pounds and utilizes a 34-foot ring slot recovery parachute for retardation and a crushable nose cone for energy dissipation on impact. By using four M-4A containers, the full payload capacity of the Mohawk would be realized for emergency resupply missions.

Engineering design is being performed on an airborne communications panel set. This 64-panel set will be used in combat area landing zones to mark landing sites by color for flights of helicopters and to indicate landing points by number to individual aircraft within the flight. This will enable aviators to land and discharge loads with maximum speed and safety.

New parachute canopy has been standardized recently for the 28-foot back type, freefall emergency parachute used in Army Aviation. The new canopy is divided into four colored panels. One-third of the canopy remains white, one-third is orange, one-sixth is olive green, and the remaining one-sixth is khaki. This canopy will give the downed aviator an additional aid in search and rescue operations, or it can be used for camouflage and concealment.

Only a brief summary of the Quartermaster's role in Army Aviation has been discussed. Most of the projects and items covered are still in various stages of research and development and not yet standardized for Army use. The rapidly increasing role of Army Aviation in the military security of our country becomes more apparent daily. The Quartermaster will continue to support this mission to the utmost.

Figure 4. M-4A High Speed Aerial Delivery Container



THE
U. S. ARMY
BOARD
FOR
AVIATION
ACCIDENT RESEARCH

TWX excerp

L-19 MISSING IN FLIGHT. Aircraft departed West Coast airfield in late afternoon. No radio contact with any tower after departure. Aircraft still missing. Search continues.

H-19 ENGINE FAILED during hovering flight. Aircraft completed hovering autorotation landing with no damage. No. 7 cylinder failed. Engine instruments indicated normal at time of failure.

TL-19D ENGINE FAILED IN FLIGHT. Aircraft completed forced landing with no damage. Cause of engine failure undetermined pending analysis.

L-20 VEERED RIGHT during takeoff from field strip. Aircraft then started a left turn and the left wing struck trees on side of strip. Left wingtip was sheared and aircraft continued a left descending turn to impact, then burst into flames. Passenger in right front seat escaped with minor injuries. Pilot killed. Aircraft destroyed. Possible 90° crosswind from right may have been factor.

HU-1A TOUCHED DOWN TAIL LOW during practice 180° autorotation. Application of full aft cyclic and simultaneous collective pitch caused mast bumping. Aircraft became airborne, then landed again. Main rotor blade flexed into and buckled tail boom. Major damage to tail boom and tail rotor drive shaft cover. No injuries.

L-19A ENGINE FAILED to develop full power during recovery from descent for low reconnaissance. Left main gear struck top of ridge during forced landing attempt. Gear collapsed and aircraft nosed over to inverted position. Suspect carburetor malfunction. Major damage. No injuries.

H-21C TOUCHED DOWN TAIL LOW with high rate of descent during demonstration autorotation. Hard landing caused gear to spread and tail cone struck runway. Incident damage to tail cone, jacking point and aft fuselage skin. No injuries.

L-20A ENGINE MISSED, then stopped. All attempts to restart engine were unsuccessful. Crewchief bailed out at approximately 3,500 feet and pilot bailed out at approximately 1,000 feet. No others aboard. Aircraft lost at sea. Pilot and crewchief hospitalized for minor water exposure after helicopter rescue. Engine instruments were all in green at time of engine failure.

H-34C TAIL ROTOR STRUCK TREE during break from rocket run while practicing for demonstration. Incident damage to tail rotor blades. No injuries.

H-21C HOVERED INTO TREE during landing. Aft rotor blades damaged. No injuries.

L-19E STRUCK WIRES during low reconnaissance for road landing. Wires were severed by main landing gear. Wires struck and broke pilot's right window, causing incident damage. No injuries.

H-13G ROTOR BLADE DENTED during attempted message drop when message drop kit went into main rotor.

L-19E STRUCK TREE during landing approach. Incident damage to right wingtip. No injuries.

H-21C EMITTED UNUSUAL NOISE during normal cruise at 1,200 feet. Engine check revealed cylinder head temperature rising rapidly to red line. Forced landing completed with no damage. After landing, engine oil temperature rose to 130° and engine oil pressure dropped to 50 psi. Suspect cooling fan and hub assembly failure.

U-1A ENGINE PARTIALLY FAILED in flight due to loss of oil. Aircraft completed forced landing with no damage. Suspect failure of exhaust valve push rod in No. 2 cylinder.

H-19D OIL LEAK on left main gear strut noted in flight. Aircraft completed landing with no damage. Stud connector to tube assembly sheared, allowing oil to flow overboard.

cerpts from march and april

H-13H ENGINE FAILED in flight. Aircraft was autorotated to nearest clear area. Partial pitch was pulled and aircraft flared to clear wire across flight path. Autorotation continued with low rpm to touchdown. Aircraft made sudden left turn and rolled on right side. Tail boom severed; bubble demolished; right skid and cross tube sheared; main rotor blades destroyed. No injuries. Cause of engine failure undetermined pending analysis.

L-19A STRUCK WIRES while contour flying. Aircraft returned to home field with no difficulty and landed. Incident damage to propeller, left wing, cowling, right landing gear strut and fuselage belly. Pole supporting wires was hidden behind tree at the crest of a hill, making wires extremely difficult to see.

AO-1 MOHAWK STRUCK GROUND during attempted low-level roll while making demonstration pass across airfield. Pilot and instructor pilot killed. Aircraft destroyed.

L-20A STRUCK FENCE POST during road takeoff. Minor damage to left main gear strut.

H-19C MAIN ROTOR STRUCK tail rotor of parked H-19D while H-19C was taxiing between the parked H-19D and a ditch. Hole punched in main rotor blade cap of taxiing aircraft. FM antenna broken and tail rotor blade dented on parked aircraft.

H-37 BEARING FROZE on pitch change shaft, causing complete antitorque failure during test flight. Aircraft completed forced landing with no damage.

U-1A ENCOUNTERED SEVERE DOWNDRAFT during strip landing approach. Aircraft struck on right main landing gear and bounced. Aircraft was flown back to main field and landed without further incident. Bulkhead adjacent to upper right main gear strut attachment fitting wrinkled.

HALF-TON VEHICLE BACKED INTO tail pylon of parked H-34. Tailgate of vehicle crushed bottom of pylon forward approximately 10 inches, causing $3,000 damages.

L-19A CONTROL WAS LOST when aircraft encountered turbulence in wake of preceding Super Constellation aircraft during landing approach. Pilot and passenger suffered slight bruises. Major damage to fuselage, both wings, and propeller. Sudden stoppage of engine.

H-13E ENGINE FAILED in flight. Aircraft completed forced landing with no damage. Hole burned through cylinder head between exhaust valve seat ring and cylinder head, No. 6 cylinder.

TL-19D CRASHED INTO MOUNTAIN during attempted VFR approach. Pilot and passenger killed. Aircraft destroyed. Prior to approach, pilot called for weather. Weather was reported as 2,000 feet broken, 4,000 feet overcast, visibility 7 miles, light rain. Pilot requested IFR clearance to airport. Controller requested altitude of aircraft and received this reply: "Cancel IFR request. We are breaking out."

H-13E RAPIDLY LOST RPM during flight. Aircraft was autorotated into rice paddy, terminating in a power recovery. Check of all engine instruments and both magnetos indicated no engine malfunction. Running takeoff was attempted and engine failed at altitude of approximately 4 feet. During attempted landing in adjacent rice paddy, left front skid dug in and caused the aircraft to nose over. Aircraft destroyed. No injuries. Cause of engine failure undetermined pending analysis.

HU-1A ENGINE EXPLODED at 2,500-foot altitude. Aircraft completed forced landing with no damage. Internal explosion in compressor section of engine. Resultant heat caused destructive damage to engine and slight damage to engine cowling. Cause of engine explosion undetermined pending laboratory analysis.

Memo from Flight Surgeon

Hypoglycemia In Aviators

Captain Dominic J. Rosato, MC

HYPOGLYCEMIA is a big word which simply means low blood sugar. It represents a dynamic, changing state in which sugar is removed from the blood at a rate faster than that at which it is being replenished. Therefore, when we speak of hypoglycemia we are indicating that there is a certain imbalance between normal body processes and intake of food. The end result is a low blood sugar. It is not a disease but only a condition or state. Further, we must understand that the hypoglycemic state, no matter what the cause (and we will discuss only the most common cause), is attended by similar if not identical symptoms and signs.

Medically we can make this diagnosis easily if we find an individual demonstrating the symptoms and signs of hypoglycemia. However, it behooves us as flight surgeons and you as aviators to be able to recognize this condition without the aid of laboratory tests. While at times this may be difficult, in the majority of cases, a layman can learn the symptoms well enough to recognize this condition when it occurs in themselves or others. Many diabetics, for instance, have been successfully taught to recognize this condition in themselves.

The earliest symptoms of hypoglycemia are sweating, weakness, hunger, palpitations, facial flushing, and "inward trembling." If the hypoglycemic state is rapid in onset, prolonged in duration and severe in degree, the above symptoms progress into the so-called cerebral phase which is due to impaired brain function. In this stage the symptoms are protean: headache, dizziness, visual disturbance, mental confusion, and finally convulsion and coma may all be seen. It may progress to death in actual overdosage of injected insulin. Even with lesser degrees of hypoglycemia, flying efficiency and safety are compromised.

The mechanisms which determine the blood sugar level are multiple, complex and at best only partially understood. We will briefly mention only the most obvious of these factors. These are diet, insulin, and adrenalin. Stated simply, the following is the sequence which may and often does occur. A high carbohydrate meal is ingested. This is followed by a rapid, marked rise in blood sugar level. This in turn stimulates the secretion of the hormone insulin by the pancreas, which lowers the blood sugar. However, the duration of action of insulin is significantly longer than that of glucose; so about 2-3 hours after a meal, the insulin may have actually brought about a **low** blood sugar. This in turn stimulates the secretion of another hormone, adrenalin, which helps raise the blood sugar to a normal level. The symptoms which adrenalin produces are the early symptoms of hypoglycemia noted above.

Why do some individuals readily develop this abnormal sequence of events while in others it is difficult or impossible to produce? It has been noted that the placid, easygoing person is more resistant, whereas the tense individual with rapid gastric emptying time, aggravated by a stressful situation (i.e. flying), is often most susceptible to hypoglycemia. Nothing, unfortunately, can be done to ameliorate the fact that an aviator is under stress; it is an irremediable occupational hazard.

We can, however, prevent the full development of an episode of hypoglycemia with a simple measure of ingestion of some glucose rich material, such as candy or orange juice. This, however, is a tenuous and hazardous method of handling the situation. It is much bet-

Capt Rosato is a flight surgeon at the U. S. Army Primary Helicopter School, Camp Wolters, Texas.

A Well Balanced Breakfast

Milk	1 glass	165 calories
Coffee	1 cup	0
Sugar	1 tablespoon	34
Egg	1 each	66
Sausage	2 links	120
Toast	1 slice	60
Butter	1 tablespoon	100
Orange Juice	1 small glass	67

Of these 612 calories, 23% are contributed by protein, 40% by fat, and only 37% by carbohydrate.

ter prevented. This can be done by simply following an old adage in aviation: "Eat a good meal before flying." Some construe this to mean simply eating to one's fill. This is not enough. It must be balanced with adequate portions of proteins, fats, and carbohydrates.

All too often an aviator must begin his flying early in the morning and, not wishing to take time for a balanced breakfast, he merely eats foods which are rapidly and easily prepared, such as orange juice, cereal with sugar, coffee with sugar, toast and jelly. All these contain high amounts of readily absorbable carbohydrates which produce that rapid rise in the blood sugar level mentioned earlier. While carbohydrates reach their absorption peak in about 30-60 minutes, proteins take about 2-4 hours, and fats even longer, to be converted into sugar and enter the blood stream. Therefore, the balanced meal not only prevents the high peak of glucose soon after meals but also supplements the blood with a more sustained level of glucose over a longer period of time, thereby preventing the development of hypoglycemia.

Perhaps only a few will ever have to recognize and treat this hypoglycemic condition in themselves or others, however, all of us can be instrumental in preventing it by following the sound principles of diet to which we alluded in this paper. It may some day save your aircraft and your life! □

Air Traffic Goes Up, Up, Up At Rucker

Total landings and takeoffs at the three fixed Army airfields and the many stagefields at Fort Rucker, Ala., soared to 1,099,626 during calendar year 1960. This represents a tremendous increase over 1959, when a quarter of a million operations were recorded.

This sharp jump in overall operations can be partially traced to Lowe and Hanchey AAFs, each of which completed its first full year in business.

But Cairns AAF has continued to show an annual increase since 1954. Landings and takeoffs jumped to 243,786 in 1960. This is 49,674 more than were recorded in 1959. (See DIGEST, May 1960, page 15.)

Lowe AAF stole the honors at Fort Rucker. The field, used for primary fixed wing training, handled 290,550 landings and takeoffs to just about equal the combined total of its two sister fields.

At Hanchey, Fort Rucker's rotary wing training field, 57,683 landings and takeoffs were registered.

The stagefields (rotary and fixed wing) contributed 507,607 operations to push the final total over the million mark.

Ground control approaches, included in the above figures for Cairns and Hanchey AAFs, more than doubled. Cairns handled 20,448 in 1960 while recording 10,051 in 1959. Hanchey, in the GCA business for the first time, handled 1,692.

TOTAL LANDINGS AND TAKEOFFS AT FORT RUCKER IN 1960

	Cairns	Lowe	Hanchey	Stage-fields
VFR	223,317	290,550	57,683	507,607
IFR	20,469	None	None	None
Total	243,786	290,550	57,683	507,607
GCA (included above)	(20,448)		(1,692)	
Total Operations		1,099,626		

TOTAL FLIGHT PLANS HANDLED IN 1960

IFR	6,336	1,278
VFR	24,024	6,672
Total	30,360	7,950
Total Flight Plans	38,310	

Do It Yourself

Aircraft Maintenance Training

Colonel Robert H. Schulz

A NEW PROGRAM of Instruction designed to help Reserve and National Guard aviation unit mechanic training parallel that of the Aviation School has been prepared and will soon be ready for distribution. This POI is designed to assist in the conduct of weekly and annual unit training.

Reserve and National Guard units are confronted with training problems and situations that differ from Regular Army units. These units meet weekly or monthly; thus, there is less time for preparation of lesson plans, rehearsing of instructors, etc. In addition, unit aircraft are often based many miles from the training site and may not be available for mechanic training.

The needs and problems of Reserve and National Guard units were of primary concern when this program was undertaken. Their burden of preparing lesson plans and training aids has been greatly reduced. Training packets, complete with lesson outline, lesson guide, instructors manuscript, and if you desire, 35mm slides, are available under this program.

To explain the scope of the material available, a look at the aviation MOS structure is in order.

*670.0 Aircraft Maintenance Crewman
(The basic entry course at the School)
*671.1 Single Engine Airplane Mechanic
(L-19 and L-20)
671.2 Single Engine Airplane Mechanic
(U-1A)
672.1 Multiengine Airplane Mechanic (L-23)
672.2 Multiengine Airplane Mechanic (AO-1)
672.3 Multiengine Airplane Mechanic (AC-1)
*675.1 Single Rotor Helicopter Mechanic
(H-13 and H-23)
675.2 Single Rotor Helicopter Mechanic
(HU-1)
*675.3 Single Engine Helicopter Mechanic
(H-19 and H-34)
*676.1 Tandem Rotor Helicopter Mechanic
(H-21)
677.1 Multiengine Helicopter Mechanic
(H-37)

Although some courses and MOSs call for a mechanic to be qualified in two similar aircraft, the Reserve and National Guard unit normally has only one type. For this reason the material packets are broken down by type aircraft. If a unit has H-13s, only that material should be requested; however, you would be sent all the general information concerning the 675.1 MOS.

Packets for the 670.0 course are available now. The other course packets will be available soon and will be announced in the U. S. Army Aviation School Instructional Material Catalog.

National Guard and Reserve units may obtain one free packet (minus slides) of each course. Submit a DA Form 17 without letter of transmittal to:

Commandant
U. S. Army Aviation School
ATTN: AASPI
Fort Rucker, Ala.

Your order will be expedited if these items, page number, file number, title, and date as listed in the Aviation School Instructional Material Catalog are noted on the requisition form. If a school catalog is not available, just ask for the National Guard and Reserve packet on the appropriate aircraft assigned your unit. Be sure to include your unit's designation and address.

Allow a week to ten days after placing your order for the material to arrive. If you need the material faster than this, call the Department of Publications and Nonresident Instruc-

* * *

*Indicates material to be offered in packet form. (Note: This is the MOS structure and the designation of the course given at the Aviation School leading to that MOS. The June 1960 AVIATION DIGEST contains an article, "The New Army Aviation EM MOS System," which covers the new MOS structure.)

Col Schulz is the Director of Instruction, USAAVNS, Ft Rucker, Ala. He is dual rated and instrument qualified, with approximately 1,500 flight hours.

tion, Fort Rucker, Ala. (extension 2095) for a rush order. You can anticipate your future needs, and order the 670.0 course at this time.

The 35mm slides (approximately 12 to 20 per conference hour of instruction) may be purchased from the Book Department Store of the U. S. Army Aviation School. Each slide will cost about 40 cents. By using training funds available to your unit, sets of coded slides for each course can be purchased. The slides for the 670.0 course (now available) will cost about $108.80 plus shipping costs. Order the slides from:

Book Department Store
U. S. Army Aviation School
Fort Rucker, Ala.

Training films required for your particular course must be obtained through your film library.

Each course is designed to teach minimum essential information for a particular aircraft and is not of sufficient scope for the awarding of a school trained MOS. The L-19 Program of Instruction consists of only 61 hours. It adequately covers the L-19 but is not extensive enough to award a 671.1 MOS.

This program has been designed specifically for you in the National Guard and Reserve Program. It is realistic and sound. Its proper use and planning by aviation officers should result in a yearly training cycle with an attainable objective. □

From The USAAVNS

DEPUTY ASSISTANT COMMANDANT

Students have been reporting to the USAAVNS for attendance in various classes without the minimum required clothing and equipment. For instance, they have reported in at the school less APH-5 helmets, flight suits, flight jackets, etc.

All aviators in the field are reminded that some of these items are not available at the USAAVNS in sufficient quantities to issue to each student.

Attention is referred to **DA Pamphlet 20-21, "The Army School Catalog,"** dated 13 May 1957, with changes.

Change 29, para 5b, d of the Army School Catalog refers to Sec III, Appendix I, TA 21, dated 14 December 1960. Both of these publications list all the clothing and equipment of either a special or routine nature needed by students who are to attend any of the aviation courses at Fort Rucker. Boots are required for pilots attending the AO-1 Mohawk course; however, the inclusion of this in DA Pamphlet 20-21 has not been effected.

Aviation unit commanders are urged to ensure that aviators attending courses at the USAAVNS, Fort Rucker, bring equipment required by the publications mentioned above.

All special equipment not prescribed will be issued by the Aviation School.

Current items of interest from Fort Rucker

DOI

The Army Aviation Instructors' Conference, proposed for 18, 19, and 20 July (announced in the April issue), has been postponed until 1962. Recent plans call for this conference to be held biennially in the future.

DEPT OF TACTICS

"Without control, command is lost; without communications, control is lost." With this vital truism in mind, the Instructional Division has published for resident and nonresident use a book entitled "Ground Communications, Avionics and Combat Surveillance and Target Acquisition for Army Aviation Units." This is not a "press-to-talk" type book, but a consolidation of facts concerning the signal equipment used by aviation units for command and staff purposes. It is available to any unit, department, or section through the Department of Publications and Nonresident Instruction, USAAVNS.

During the summer of 1961, the first edition of a new and important publication for Army Aviators entitled "Army Aviation Reference Data" will be published by the Instructional Division. This book will contain a multitude of ready reference facts to assist in the accomplishment of tactical missions in the field. It will answer quickly many of the questions which arise for commanders and staff officers. This is not a checklist, but a consolidation of planning factors presented in data and tabular form.

* * *

The General Subjects Branch, Instructional Division, is now presenting a 3-hour class on survival. It is not an escape and evasion type orientation, but a general rundown on the facts of personal survival in peace and combat. The class needs only to be supplemented by more detailed study and training pertinent to the remote area in which you might find yourself. Interested personnel in the Fort Rucker area may contact the Operations Officer, Department of Tactics, who will be happy to arrange for attendance at scheduled presentations.

DEPT OF ADV F/W

Many students are found lacking in certain requirements after being enrolled in the U. S. Army Aviation School's Instrument Flight Examiners Course.

In many instances instructors have encountered a lack of current flying proficiency in the L-20. In other cases there is insufficient preparation to meet the high standards needed to receive an Instrument Flight Examiners rating.

The following recommendations are offered to assist commanders in selecting qualified personnel for the course and to help potential students prepare for successful completion of the 4-week course.

1. Recent instrument flight experience in the L-20 is mandatory. All ground, flight, and emergency procedures should be second nature to the student examiner. Even if the student has recent instrument experience in other aircraft, he should brush up on L-20 instrument flying before attending the course. Ten-fifteen hours or more with another instrument examiner during the 30-60 day period before enrollment is highly recommended.

2. Istrument flying proficiency must be at a high level, A student examiner is expected to fly the aircraft, navigate, tune radios, maintain flight logs, and follow ATC reporting procedures **without** assistance.

Students who have complied with these recommendations find the going much easier. Arrive prepared. It's too late to brush up after enrolling in the course.

DEPT OF P&NRI

Here is a preview of the DA FY 1962 Training Literature (Publications) Program as proposed by the USAAVNS Training Literature (Pub) Board.

Change 1 to FM 1-10, "Army Aviation Organizational Maintenance and Supply," includes addenda to the duties of maintenance officer, an explanation of how to procure inspection work cards, an updated paragraph on compression checks, safety precautions around the Martin Baker Ejection Seat, and fueling methods and precautions when pressure refueling.

The revision of FM 1-100, "Army Aviation," will be a complete overhaul. The revised manual will serve as a guide for commanders, staff officers, Army Aviators, and other Army personnel concerned with the operational capabilities or tactical employment of Army Aviation. It includes the fundamentals of employment and the service or support functions performed by Army Aviation.

A new manual, FM 1-( ), "Army Aviation Operations," will provide guidance in the accomplishment of Army Aviation operations under abnormal terrain or climatic conditions and assist in the planning and accomplishment of aviation missions not normally performed in day-to-day operations. It covers the operations and missions in sufficient de-

tail to provide guidelines for the accomplishment of special operations, such as those in arctic, desert, jungle, or mountain areas.

Change 3 to TM 1-215, "Attitude Instrument Flying," is an addition to table 2, page 32, to show airspeed and power settings for the HU-1A, as well as other minor corrections. Change 4 explains the use of the FD 105 integrated instrument system (for the AO-1 airplane).

Change 2 to TM 1-225, "Navigation for Army Aviation," will include information on low-level navigation.

Change 1 to TC 1-11, "Transition Training in the H-21 Helicopter," will include minimum flying time for transitioning.

Change 1 to TC 1-13, "Transition Training in the H-19 Helicopter," will include technical corrections to update manual.

Three new training circulars have been proposed for FY 62 and have been submitted for DA approval: TC 1-( ), "Machine Gun Kit, H-13 Sioux"; TC 1-( ), "SS-11 Wire Guided Missile System, HU-1 Iroquois"; and TC 1-( ), "Transition Training in the AO-1 Airplane."

In addition, TCs 1-4, 1-10, 1-12, and 1-14 (transition training in the U1-A, HU-1A, H-34 and H-37, respectively) are being revised to include the addition of the HU-1B in TC 1-10.

CDO

The success of Army Aviation on the nuclear battlefield will be measured by its ability to operate in the airspace at treetop level. Methods of solving the low-level, high-speed navigation problem are currently under study by the CDO.

One method being studied utilizes a terrain avoidance and ground mapping radar system. This system provides the pilot with an accurate presentation of the terrain in front of his aircraft. Pilot orientation is maintained by correlation of the radar scope presentation and a map of the terrain along the desired flight path. This system will also provide the terrain avoidance capability and the ground mapping system during periods of darkness and low visibility.

From The USA Avn Board

In the past 10 years, Army Aviation has come face to face with many areas at one time believed to be nonessential to the Army Aviator in fulfilling his mission. Some of these areas are instrument qualification, navigational aids and systems, VHF-UHF communication equipment, multiengine aircraft, turbine-powered equipment, fire suppression systems, speed brakes, IR sensing devices, drones, etc. This never ending evolution of new equipment now brings us to another area: Emergency Escape Systems.

At first glance one might think this is a sophisticated system applicable only to those who venture into the supersonic realm. If you fall into this category, then pay heed, for some day in the near future you will come in contact with a new escape device which you must accept in your subsonic environment.

The ejection seat is here today in the Mohawk, and research is continuing to ultimately provide a reliable escape system for the VTOL/STOL aircraft of the future. In future conflicts, the Army Aviator will fly a large percentage of his time at treetop level and slow speeds. This then dictates the optimum escape system, one that has an 0/0 capability. This means a safe ejection at zero airspeed and zero altitude. Desirable parameters of such a system are as follows:

- Escape capability to match the entire aircraft envelope.
- G forces within human tolerance limitations.
- Controlled stability during ejection.
- Automatic retention and release without crew pre-positioning requirements.
- Positive seat-man separation.
- Survival equipment integrated to crewman's harness.
- Simplified inspection and maintenance.
- Maximum reliability.

The Aviation Board is monitoring research and industrial efforts relative to subsonic escape systems and is gaining valuable information on ejection seats presently employed in the T2V, F9F, Mohawk, and G-91 airplanes.

The parachute will continue to serve, but the day when an Army Aviator simply opens the door and jumps is rapidly coming to an end. Altitude restrictions and aircraft configurations are forcing a new concept to cope with an emergency escape system. The problems of escape and survival are numerous and well known at high speeds and high altitudes but the aeronautical engineer faces just as many headaches in solving the unique problems inherent to treetop operation at slow speeds. □

USATRECOM

Army Transportation Research Command

PERFORMING the research leading to a family of air vehicles uniquely suited to the Army's needs is the role of the U. S. Army Transportation Research Command in the Army Aviation program.

These aerial vehicles will provide mobility and an unparalleled degree of flexibility and agility to combat and logistical operations on the modern battlefield.

An approved 10-year blueprint of the Army's aviation needs has been provided by the recent Army Aircraft Requirements Review Board (Rogers Board), headed by Lt General Rogers and consisting of a number of the Army's most experienced general officers.

This family of vehicles will be unique, as compared to the aircraft of the Air Force or Navy. Their characterization stems from the Army's combat environment. They must perform their missions and be supportable in any combination of natural, geographic, and induced environments in which the Army may expect to do battle. They must also be strategically deliverable to that point. The objectives of the USATRECOM aviation research program are founded in these vital considerations.

Part of this research program is generally devoted to applied research objectives. These will contribute to specific air vehicles for which formal requirements are presently established. Another portion of the research program is directed to those objectives stemming from the Army's peculiar environment. These objectives form a group of characteristics common to most, or all Army aircraft.

These are some examples of general objectives:

- VTOL and/or STOL capability. Operation in forward combat areas will require all Army aircraft to possess such a capability to execute landings and takeoffs on unprepared terrain.
- Suitable flying qualities throughout a high ratio of maximum speed to minimum speed. This will be required in many cases.
- The highest order of reliability in dynamic components consistent with practical structural weights. This is essential. The capability of the aircraft to be adequately maintained in the field environment by available Army personnel with available equipment is required.
- Air vehicles either strategically self-deployable or transportable in Air Force type aircraft.
- An all-weather, day and night flight capability. This will often be required. In some cases this capability may be closer to that required of a truck rather than that required of commercial airliners.
- Inherent passive defense measures. Noise reduction, absence of prohibitive dust-raising downwash velocities, and a degree of relative invulnerability to detection and firepower are necessary.
- A reasonable degree of flight safety and crash safety. These must be provided, taking particular cognizance of nap-of-the-earth, often slow or hovering, mode of operation.

In pursuit of these objectives, the USATRECOM Aviation Research Program ranges functionally from the development of new aerodynamic theory through preliminary design studies, parametric design studies, wind tunnel investigations to the design, fabrication and flight investigation of complete test bed aircraft. In accomplishing these functions, only a limited amount of in-house work is performed. The predominant portion of the program is contracted for with industrial and academic institutions. Close coordination with NASA, the Navy, and USAF is maintained, and joint programs are often used. Several such programs are now underway.

In recent years a major ef-

fort has been in the investigation and test of relatively new lift propulsion concepts for achieving V T O L capability. Fundamentally, the objective is to combine the extreme flexibility of the helicopter with the longer range, higher speed characteristics of more conventional aircraft. USATRECOM has played a major role in the VTOL program in sponsoring a family of seven experimental test beds.

While this generation of aircraft is in the final stage of testing and plans for further development are proceeding, preliminary investigation of m o r e recent concepts h a s begun.

For example, a parametric investigation of possible propulsion systems solutions to the problem of the disparity between the cruise power and hovering power required in higher speed VTOL aircraft was initiated in 1956. Preliminary work indicated the tip-turbine powered lift fan as a promising solution. It first led to the fabrication and bench test of the experimental propulsion unit, and subsequently to a fan-in-fuselage, full scale wind tunnel test. Preliminary wind tunnel testing of a lift fan system has now been completed and a fan-in-wing version is currently being prepared for test. An artist's concept of such an experimental aircraft is shown in figure 1.

Wind tunnel investigations have been initiated to evaluate the applicability of the widely heralded ground effect phenomena, which replaces the normal type of landing gear with an air cushion.

Rotorcraft are also expected to play an important part in Army operations because of their hovering and short haul efficiency (see concept drawing of an advanced high performance helicopter in fig. 2). Research work is underway to increase payload and range, and to decrease maintenance and complexity. Also expected to contribute to more capable, lower cost machines in the future is work on tip-propelled rotors, jet-flap control systems, simplified rotor hubs, drag reduction, increased lifting efficiency, vibration and noise reduction, and improved transmission systems.

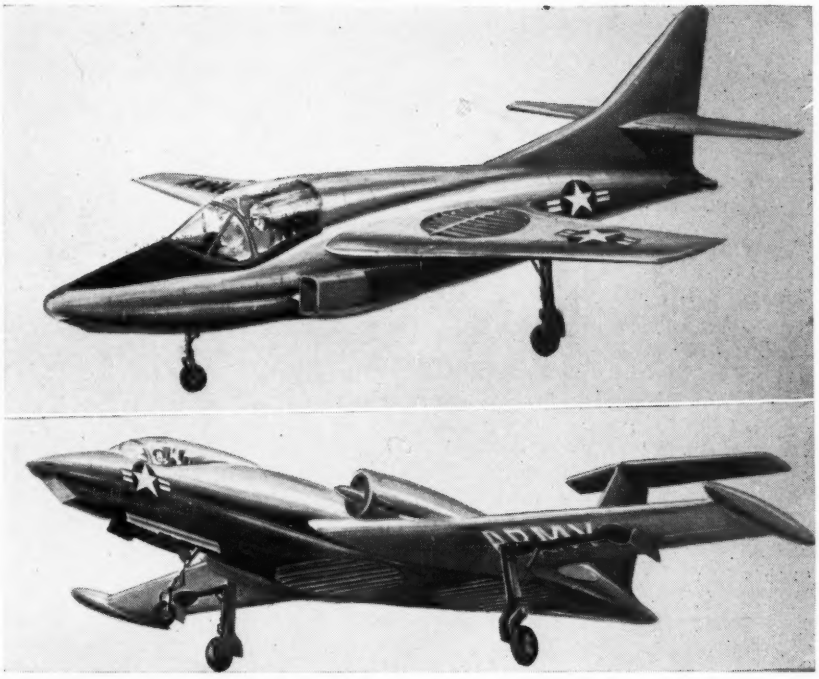
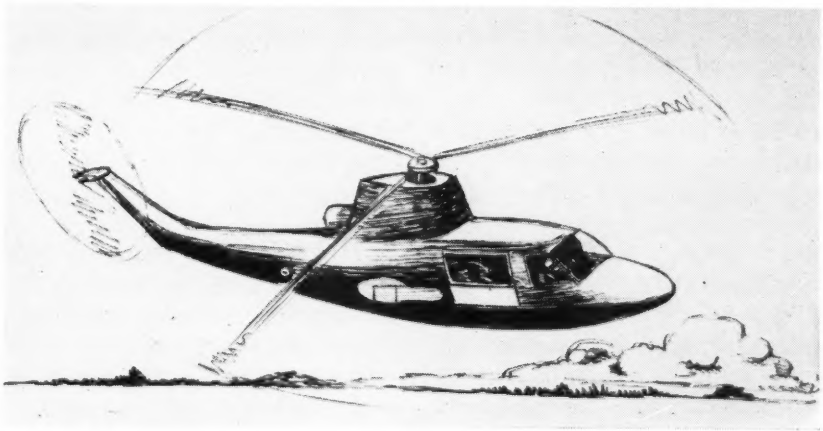


Figure 1

New concepts in mobility are especially welcome when new, useful, and practical capabilities can be anticipated. The concept of the flexible wing structure (fig. 3) originated by Rogallo of NASA is an example. Range extension, airdrop,

Figure 2



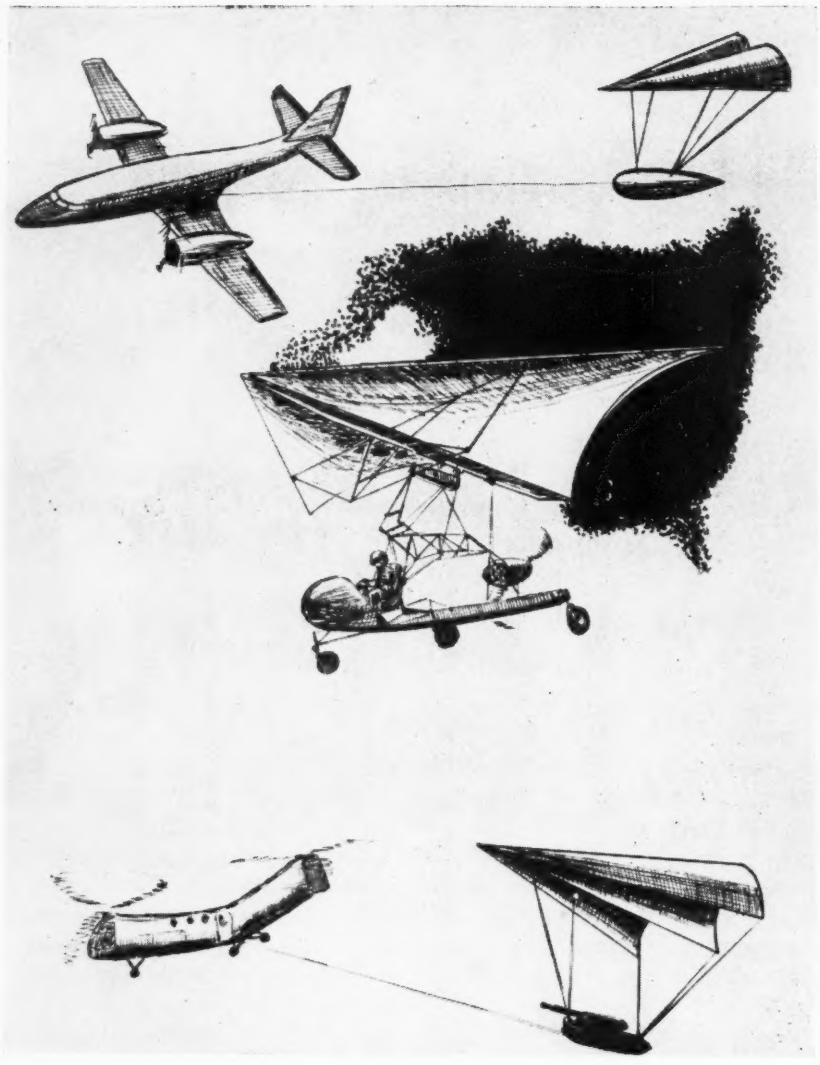


Figure 3

and heavy lift potential are embodied in the naturally stable, foldable wing structure. The concept will be investigated in an experimental flight article in a joint NASA-Industry-USATRECOM program. Future work will be based upon initial results.

Less glamorous ground support and maintenance equipment research is also essential. In this field an experimental model of an electronic diagnostic system for aircraft is underway. The integration of indications from temperature, vibration, and pressure sensors into simple go-no-go indicators should reduce maintenance manhours, prevent unnecessary component removals, prevent many inflight failures, and increase aircraft availability generally.

Of considerable significance is the program of arming Army air vehicles for suppressive fire. A classified program that cannot be detailed here, it is substantial in scope and expected impact.

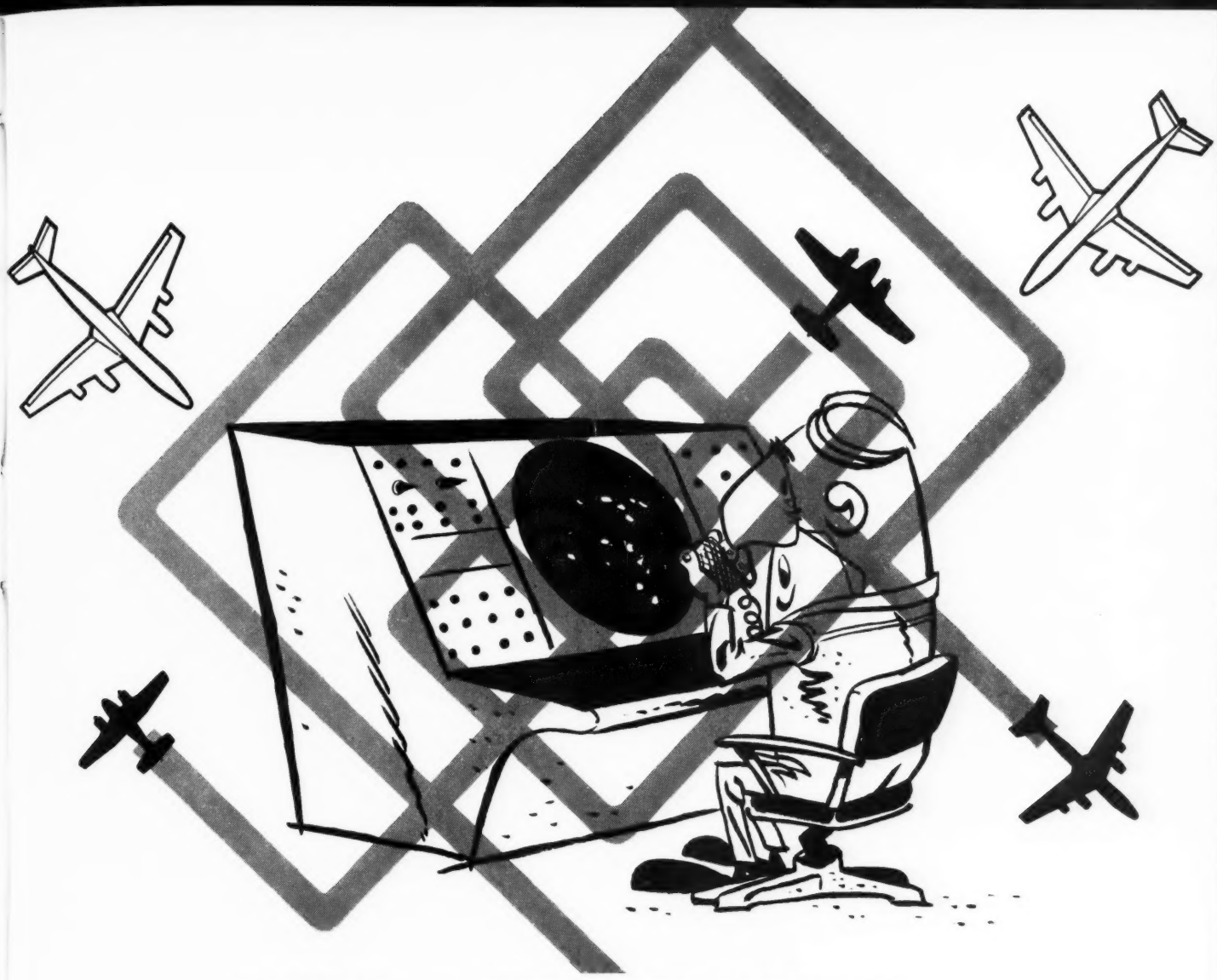
Our discussion has covered only some of the areas of the research program and only a few of the items within these areas. Many areas, such as flying qualities research, application of new materials, improved components, and others, have not been discussed.

It is perhaps more important to establish that the genesis of the program lies in the air vehicle and its application in the combat environment. The applicable concepts, the inherent problems, and possible solutions worthy of research are limited only by the vision, imagination, and technical skill applied.

Industry participation in the Army Aviation Research Program is welcomed and encouraged by USATRECOM. The importance of participation by industry is fully recognized. As previously mentioned, a substantial portion of the annual program is contracted to industry. A substantial portion of the annual program is either the direct result or indirect outfall of unsolicited proposals received from industry.

Recently USATRECOM has established the Long Range Technical Forecast office which will deal primarily with the longer range technical planning and forecasting for the research program. Industry is invited to contact this office relative to any inputs or suggestions concerning the longer range outlook.

Airmobility will play an important role in the total Army capability. The effectiveness of the USATRECOM research program is a fundamental factor in the degree of airmobility which may be obtained. Industry will be a primary force for accomplishment of such an effective Aviation Research Program.



FOUR LANE SKYWAYS

Carolyn Hughes

A LOT OF WASH has gone over the props since our L-4 days and we have a few words of traffic wisdom for our skyriders in this Mach plus 4 era.

Back in our low freq past, riding the beam was a bit like joggin' along the range in a comfortable western saddle. But nowadays we have a maze of air traffic control rules to keep abreast of, electronic marvels to aid and spur us on . . . and lots and lots of company.

The live-it-up man of the sky is out. Today, control of the airways is surer and strictly enforced. We're fenced in. At the risk of sounding preachy, we should like to point out that the Army Aviator's responsibility to live with others increases in direct ratio to the traffic in the sky. And this is increasing daily.

With all the positive controls at the pilot's command — usually but a dial twist away — don't stint!

Starting in January of this year, with a phase-out date of February 15, the Federal Aviation Agency assumed operation of Military Flight Service. As we dip a wing in fond farewell to an old friend, MFS, it's best to remember that we are now a part of the big

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Mrs. Hughes is a publications writer for the Literature Division, USABAAR. She has been a feature writer for several metropolitan newspapers.

picture. It is time to get with the group. Although procedures are expected to remain the same, changes are bound to come. The hep aviator will keep current.

The Army operates more than twice as many aircraft as all the scheduled commercial airlines do. As administrative flights into high density areas increase daily, the Army pilot's duty is plain. He must fly his mission with maximum efficiency, be it a VFR or IFR flight.

But what is max? Certainly the sharp airplane driver will use all the aids at his command, and these are numerous as dramatized by the new Atlanta Air Route Traffic Control Center at Hampton, Ga. Here a whole roomful of controllers operate long range radar, monitor flights, and talk directly to pilots on IFR flights.

In creating this one-for-all air traffic control net, the FAA has established 425 Flight Service Stations, and they will absorb the duties of the Military Flight Service. FSS are often referred to as tie-in stations as they connect the intricate web of 30 Air Traffic Control Centers that dominate the country. They also tie in with flight operations at established military airfields.

Many accidents on file at USABAAR could have been avoided by taking advantage of the unlimited controls in the area. In one case pilots flying into a high density area in bad weather did not take the precaution of filing IFR even though weather was marginal. When they did get into trouble, apparently they did not even take advantage of a radio dial. In another accident, had the VFR pilot been "followed" he might have been warned away from bad weather, or at least steered away from the mountainside.

When such crashes occur in residential areas, tragedy is compounded by official embarrassment for what is considered by FAA as careless and reckless piloting.

During most of our aviation history, the services have gone it alone, with the only controls being those imposed on us by our superiors. Now that a civilian agency has assumed command of the airlanes, the advantages as well as the rules must be taken and observed.

Like most partially reformed hot pilots, we have taken the zealot's road . . . forever trying to get the message across. To get the big picture in air traffic control, a sortie was made to the latest in electronic wizardry, the new Atlanta Center. Here, IFR flights are monitored. To round out this research project, a side trip was made to the Flight Service Station, and their latest package deal — Flight Following Service — was given a go-round. Even an old pro would perk up and listen.

HUB FOR IFR . . . THE CENTER

Struggling to hold his Cessna on the taxiway at Atlanta as it was buffeted by the takeoff jet blast of a DC-8, the pilot shouted to the tower, "Man get me outa heah!"

Getting in and out of a big city airport at rush hour these days is no job for an amateur, whether he's flying Army 123 or a slicked up new civvy job. (The cool calm tones of the tower operator guided the Cessna into takeoff position and he bugged out, happy to go.)

We were getting the picture all right.

Filing IFR on a strictly CAVU day, we cleared for Abbeville and maintained 5,000, cruising at 150 kt and making our check points on schedule. In this short hour-long IFR flight, we encountered all problems: one route change, one altitude change, and the holding pattern. When we hit Atlanta approach control, the fun began. We were told to climb to 6,000 and hold. With eight other aircraft waiting, it was enough to give even the old pro a turn.

Juggling us with the many blips on his radar scope, the controller got us down in no time, slick as a whistle, four Army aircraft, an Electra, a DC-8, a Convair, and Capital 780. Not much like going over the barrier in the old Rabbit Hill days at Fort Sill, but a different kind of strain.

At the FAA's new Atlanta Air Route Traffic Control Center in Hampton, we picked up a lot, including their motto: "When in doubt, coordinate!" In charge of all controlled traffic, the center handles some 14,415 miles of airways in an 80,000 square mile area.

Backed up by a battery of the latest equipment, 316 controllers handle the traffic. Their radar extends from Atlanta to Montgomery, Ala. This gives them ample opportunity to chew their nails over VFR types dodging about the sky, confusin' the scene.

Biggest selling point to the Army Aviator being urged to file IFR today is that delays of old have been cut. The rapid expansion of VHF and UHF communications facilities has proven to be a great boon to both VFR and IFR pilots. The installation of remote trans-

mitters and receivers now makes it possible for pilots operating IFR to talk directly to center controllers even though they may be hundreds of miles away. This eliminates a whole line of possible relay goofs. Direct pilot-to-center contact greatly speeds up communications and, coupled with expanding use of radar, has done much to eliminate holding delays and round about routing, despite increasing IFR traffic.

It doesn't take long to get the picture at Center. From the balcony overlooking the control room you can watch the men, wired to their positions by earphones and mikes, talking their planes in. You can watch them pour intently over the radar scopes, tracking the aircraft. You can watch the men prepare flight data strips; and the final pieces of the picture begin to fall in place in much the same way as the strips themselves do on a two-bay strip holder.

Preferential air routes—or one-way streets —have been set up over most of the nation. According to the FAA men, these establish better pattern making and it's almost a reflex for the controller to see a plane going the wrong way.

No one could ever accuse us of having an ear for music but the concise, pure tones of a pilot making radio contact with the tower in the proper way is real cool music.

The heart of any air traffic control system will always be a brief, clear exchange of intelligence between pilot (or copilot) and controller. In their training department, the FAA soft-pedals accents and standardizes phraseology. Those "oveh yondahs" give color to the airwaves, 'tis true, but they might cause a big mix. "Never assume anything!" is the controllers' cardinal rule. Aviators are encouraged to ask short, quick questions and always identify themselves in the same way.

Tempers rarely flare in the control room. The politeness is a built-in, or rather a trained-in, quality. The trip to Center was interesting and designed to convince the unbeliever that controlled flight, under many conditions, is the Army Aviator's ticket. It also sold us that positive control of the airways is here to stay.

VFR . . . FLIGHT FOLLOWING SERVICE

Radical changes have been made in the old FAA radio stations along the air routes. Instead of communications stations they are now called Flight Service Stations, and that is just what they are there for: to be of aid and assistance, primarily to the VFR pilot. They have assumed the duties of MFS for relaying flight plans and are tied in with operations offices at military flying fields. Military pilots at fields without FAA facilities may make collect calls to the nearest stations for weather briefings and filing flight plans.

The service these stations render has been greatly stepped up, and the new program afoot to gather pilot reports about unusual local conditions aloft is just one of their services. Another is called Flight Following Service, which means FAA stations along your route will be expecting you and will report weather conditions, ground facilities, and other flight advisories to you as you pass by.

Trying out the service firsthand on a trip into Florida, we discovered that it sure trims the margin for error. A fast moving cold front terminated our return and our first indication of deteriorating weather conditions came after requesting flight following service from Orlando. FSS can be your ticket to free advice and painless control.

On a 2 hour and 50 minute flight to Stuart, Fla., we filed our plan from the air and requested flight following service. Accepting our plan, they told us to stand by and, within a short time, we were given the first two flight watch stations along the route: Gainesville and Orlando. The winds and marginal weather, including restricted visibility due to ground fog, were given. Reporting at Gainesville 10 minutes inbound, they gave us a special report: the omni at Ocala was shut down until 1200. Checking about 30 miles out of Vero Beach, as requested, we closed our flight plan and the flight following service. Asking for facilities at our destination, we were told Stuart was on UNICOM.

It was an easy, comfortable jog with lots of company and advice along the way.

Fast moving weather on the trip back dramatized the fact that a VFR flight made with Flight Following Service has its merits. Requesting flight following from Orlando, they gave us deteriorating weather at our destination, and after an hour the flight was terminated.

A briefing from the swamped FAA controllers at Gainesville — in their slick and shiny new office — convinced us that the front was moving at a fast clip, and the place to be was a nice quiet bar. More to the point, it convinced

us that Flight Following Service, while still in the experimental stage, has much to offer the man on a VFR flight, be he a 4,000-hour pilot or a new grad.

WEATHER INTERPRETATION

You may be sure a good deal of hangar speculation followed the transfer of MFS to FAA, but the official word is finally out.

In view of the recent change in regulations permitting some relaxation and additional clearing authority to certain rated pilots, it would seem fairly obvious to us that added emphasis on education, mature supervision, and fuller weather interpretation will be needed.

Weather offices at military fields will operate much as they have in the past, but FAA stations have increased their weather briefing capability in an attempt to fill the MFS gap.

Under the old rules, the FAA (or CAA) man was limited to use of factual information from the sequence reports with no interpretation of the data. Now, under a joint FAA and Weather Bureau memorandum of understanding, specialists have weather **briefing** responsibilities and authority essentially equivalent to Weather Bureau briefers.

VIOLATIONS CAN CLIP WINGS

Commands are often lax in filing violations against their pilots flying in local areas. Cutting capers on airways — whether aviators are practicing legitimate air maneuvers or not — is a direct violation of air traffic regulations.

As crash headlines continue, civilian complaints against alleged air traffic violations are bound to increase — and this will naturally include the military. Pilots allowed to loop, spin, and tool carelessly about their own home airways in control areas are likely to do so abroad.

This is a command problem and should be handled as such. Ignoring tower instructions, cutting other planes out of the pattern or making a wrong entry — these violations are often reported by tower operators, but under some commands it ends there.

On every military installation, ground traffic is so tightly controlled that even a grasshopper stops for a school bus. But often far more dangerous flying practices go unreported, or, if reported, they are dropped at that.

Under their new directives the FAA says: "Alleged violations (concerning military air traffic) will be filed with FAA tie-in stations in the implemented area. Only those which are filed in writing will be accepted. Such reports will be sent to the Post Commander. When the home base of the pilot is not known, they will be delivered to the headquarters of the Army area."

These sky cops may not give you tickets, or chase with sirens, but they sure can get you grounded. Take it from one who should know, getting your wings clipped can cause a real stir, with or without flight pay insurance.

SEE AND BE SEEN . . . A PHILOSOPHY

Summing up, we would like to caution pilots not to let the wonders of the age lull them into a sense of serenity. The electronic brain (with or without the memory drum) has not been built yet that will replace the human version. It is still up to number one. Here are two pitfalls:

The see and be seen philosophy is as valid under today's controlled situation as it was during the barnstorming heyday. Some pilots tend to drop their traffic watch after receiving radar departure. A promise of surveillance and notification of incidental VFR traffic that might be tooling about does not relieve the pilot and crew of constantly rubber necking. Many factors, such as limitations of radar, volume of traffic, and workload may prevent a controller from providing this additional service.

In other words, in a mixed VFR-IFR condition there is still one consistent protection. That is the pilot's and crew's own visual awareness of what's ahead.

The second common error is failure to conform to basic rules or procedures stressed since flying days began. In a recent Navy safety bulletin, the three words SELECT, TUNE, AND IDENTIFY were used as watchwords for proper radio procedure. To discover in an accident investigation that the pilot failed to tune in properly is a chilling revelation.

An everyday goof, failure to repeat clearances correctly and promptly, and failure to comply with clearances, especially position reports, can have serious consequences.

So, to wind up this ball of string, you might say that today's air traffic control is a matter of control in its most basic sense. The pilot is still master of his ship. □

CRASH SENSE

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

MAINTENANCE GOOFS

Missing plug

THIS IS A CRASH FACTS MESSAGE

1. —MARCH 0225 HOURS (ZULU), FORT _____.

2. H-21C 55_____, ___TH TRANS P (LT HEL) (H-21).

3. FORCED LANDING, NO DAMAGE.

4. PILOT, TEST FLIGHT, _____ _____ _____ W_____, CWO-W2, __TH TRANS DETACHMENT (CHFM), FORT _____, SHOULDER HARNESS USED, HELMET USED, NO INJURY.

5. NOT APPLICABLE.

6. NOT APPLICABLE.

7. TURNING FINAL APPROACH, AIRCRAFT SHUDDERED AND TACHOMETER NEEDLES SPLIT. AUTOROTATION WAS ENTERED AND FORCED LANDING SUCCESSFULLY ACCOMPLISHED.

8. WEATHER NOT CONSIDERED A FACTOR.

9. ENGINE FAILURE CAUSED BY OIL STARVATION. AFT MAGNETIC SUMP PLUG MISSING. SUSPECT PLUG NOT SAFETIED PRIOR TO FLIGHT.

Thanks to some heads-up flying, this was another case where a maintenance goof resulted in a few moments of terror for the pilot but no damage to the aircraft.

Maintenance, either faulty or inadequate, does not appear statistically as a significant cause factor in aircraft accidents. Much of the credit for this must go to aviators who convert potential accidents into uneventful forced landings. During calendar year 1960, there were 175 (44 fixed wing, 131 rotary wing) forced landings without damage.

Maintenance, like any professional task, demands a system of checks and rechecks. The mechanic whose work is so perfect it requires no inspection is yet to be found. Regardless of how dedicated to their jobs, how well trained or experienced, mechanics are human. They will make mistakes. The system of maintenance checks and rechecks is fully covered in TB AVN 5. Here are some pertinent quotations:

Paragraph 18a. "A red cross indicates that the aircraft is considered unsafe or unfit for flight, and that, until this unsatisfactory condition is remedied, the aircraft will not be flown. No one will authorize or direct that an aircraft be flown until the red cross is properly cleared. The red cross will be entered in the appropriate loca-

tions of DD Form 781-2 immediately upon discovery of a condition serious enough to warrant its use."

Paragraph 18d. "It will not be necessary to enter a red cross to indicate an unsafe condition caused by the evident removal of parts or assemblies when the removal is perfectly obvious and the mechanic remains at work on the aircraft. **However, if the removal is such that improper reinstallation would create a hazard to safety, a red cross will be entered on DD Form 781-2 to assure an inspection by the aircraft maintenance supervisor or other qualified supervisory personnel as designated by the aircraft maintenance officer."**

Paragraph 18f. "The repairs made, or work accomplished, to remedy the dangerous condition indicated by a red cross will be inspected by the organization inspector or other qualified supervisory personnel as designated by the aircraft maintenance officer. This inspection is required to insure that the work has been properly accomplished and that nothing has been overlooked. If the work is found to be satisfactory by the inspector, the person who accomplished the work will place his initial over the red cross symbol in Block 25, enter the corrective action taken in Block 27, and enter his first name initial and last name signature in Block 28 of DD Form 781-2. Subsequently, the inspector will make a clearance entry, 'Insp. O. K. (first name initial and last name signature),' any place on the line on which the corrective action is entered. If the space is crowded, this entry will be made immediately above the mechanic's signature in Block 28. After clearance of all red cross defects appearing in Block 26 of DD Form 781-2, in the manner prescribed above, the symbol representing the next most serious condition will be entered in the next open square in Block 9, Status Today."

Any attempt to shortcut this system will likely result in a TWX crash facts message as a forced landing without damage, an incident, a minor or major accident.

LOOSE COWLING

An Iroquois aviator landed at a heliport and found the left transmission cowling missing. The left engine cowling was unfastened and striking against the tail boom. Later, the transmission cowling was found 8 miles from the heliport.

This incident, like the missing sump plug, is more serious for the consequences **avoided** than for what actually happened. Loose cowlings, doors, and windows have been known to enter main and tail rotor systems and cause fatal accidents.

Here, the system of check and recheck failed somewhere between the mechanic who installed the cowlings and the pilot's preflight. Because of a fear of offending maintenance personnel, pilots have been known to skip preflights entirely or substitute a fast walk-around. If you ever get this feeling, remember, you're betting your life on another man's work. The mechanic who takes offense at a thorough preflight should be back under the shade tree working on a Model T. He has no place in the complex maintenance requirements of today.

PRESSURE

Abnormal pressure to do a job in a hurry has variable results. In the Madison Avenue type, it causes ulcers. Applied to an Army aircraft maintenance schedule, it can cause far worse.

Due to a VIP visitor, a particular command needed 15 aircraft operational when the normal average was 5-6. A 1030 hours deadline for the following morning caused abnormal pressure on maintenance personnel and test pilots. Here's what happened:

One test pilot took off in a

Missing scissors link (inset) caused $8,000 damages

Oil pressure relief valve installed in reverse

Shawnee to check trim adjustment and vertical vibration. Shortly after takeoff, at an altitude of approximately 50 feet, the nose of the aircraft rose sharply. Unable to correct the nose-high attitude, the pilot immediately lowered collective pitch and landed in a rice paddy. Damages to the aircraft amounted to $8,000. Fortunately, there were no injuries.

After the mud had settled, it was found that the scissors link in the aft rotor head was missing.

OLD FOE MURPHY

Murphy's Law is a thorn in the side of all maintenance programs. "If an aircraft part can be installed incorrectly, someone will install it that way." The only permanent cure for this bugaboo rests with design engineers. Until every part in every aircraft is designed so that it can not be installed incorrectly, Murphy's Law will be with us.

A Bird Dog aviator took off for a test flight following maintenance on the aircraft. At an altitude of between 400 and 500 feet, the engine failed. During the resultant forced landing, the aircraft was damaged to the tune of $5,000. The pilot escaped injury.

Investigation of this accident revealed that the sleeve oil pressure relief valve had been installed in accordance with Murphy's Law—to wit, BACKWARDS! This was done following a periodic inspection of the oil pressure relief plunger. And this story doesn't end here.

An inspection of all other Bird Dog aircraft within the command was ordered and two more Bird Dogs were found with improperly installed oil pressure relief valves.

BONES AND BELTS

"The thigh bone's connected to the hip bone. . . ." And right there is where your safety belt is designed to provide maximum protection—protection in turbulence, protection in case of sudden stops. Installed correctly, at an angle of approximately 45° to the floor, your safety belt will prevent many injuries and lessen others. Install it any other way and injuries are more likely to be compounded than prevented.

It is a common misconception that safety belts are designed only to provide restraint. Other factors must be considered. A short lesson in anatomy shows why. Your backbone consists of some 30 vertebrae and a coccyx (tail bone). Of these, the five lowest (sacral) vertebrae are usually fused into a single bone called the sacrum. The sacrum, imbedded between the hip bones, does not bend, but the joint between the sacrum and the lumbar vertebra directly above it — the lumbo-sacral joint — is the point where your backbone is able to bend its greatest amount. And from there up, your back is flexible to a lesser degree. With this knowledge, it is easy to see that a safety belt positioned to cause the greatest flexing at the lumbo-sacral joint affords the most protection against back injuries. If the belt is worn above the hips, it will cause your back to bend its greatest amount at some joint above the lumbo-sacral and increase the strain on each individual vertebra.

In addition to protecting your backbone, a properly installed safety belt concentrates its restraining action to the bony part of your hips where you are most able to stand it. Raise the belt a few inches and the lower, soft portion of your abdomen absorbs all the decelerative forces. This can cause serious internal injuries through compression, displacement, or rupture of organs and resultant hemorrhage.

Safety belts in the passenger compartment of one of the Army's newer aircraft, the Iroquois, are subject to improper installation.

Aviation Crash Injury Research, a Division of Flight Safety Foundations, Inc., analyzing injuries in a recent Iro-

Correct **Incorrect**

quois accident, said:

"The medical report from an accident in which the safety belts were attached to the 'O' ring states that injuries sustained by one occupant were: 'A red streak across the chest, tenderness to the lower rib cage, tenderness in the lumbar spine area, and contusion right buttock. Decreased b r e a t h sounds at right interior-anterior chest. Microscopic hematuria. X-ray revealed hazy density lower left lung field with sharply defined borders — may be fluid or contusion. This cleared somewhat by two days post accident.'

"The attending doctor stated that he felt the injuries to the chest, lower rib cage, and lumbar spine were due to the safety belt not being properly positioned over the hips. This statement was substantiated during an interview with the occupant, during which he stated the safety belt kept 'sliding up.'

"Correct attachment of the safety belts to the cables (see photos) reduces the possibility of spinal or internal injuries to the occupants involved; reduces the possibility of rear longitudinal seat support failures; and provides for greater restraint for the occupant since these cables are anchored to the primary structure."

Most of us are prone to take safety belts for granted. We put them on and take them off when required, but give little thought to the how and why. We treat our parachutes with TLC (tender loving care) and completely ignore safety belts. Yet safety belts have been responsible for saving far more lives than parachutes. Remember — you never know when that sudden stop is coming!

Homemade death trap

HOMEMADE DEATHTRAP

An Army soldier, with 500 hours flying experience in civilian fixed wing aircraft, recently met his death attempting to fly a homemade gyro-copter. Built from plans purchased from a commercial firm, the gyro-copter was assembled and taken to an airport for the flying attempt. Two of the soldier's friends towed the machine behind their car at the end of a nylon water ski tow rope.

On the first attempt, the gyro-copter was successfully flown at an altitude of approximately 10 feet and landed. The soldier reported that it handled well and decided to try it again. The next time the machine left the ground, it went up at a steep angle to approximately 25-30 feet. At this point the tow rope broke behind the car's bumper and flew up into the rotor blades, jamming the controls. The gyro-copter fell on its left side and the soldier received head injuries which later proved fatal.

Because of the soldier's fixed wing flying experience, it is suspected that the reversed control action of the gyro-copter (i.e., push forward to go up and pull back to go down) may have caused the abrupt climb which resulted in the broken rope.

The ski tow rope, advertised to have a tensile strength of approximately 1,050 pounds, was tested in a laboratory and broke with a pull of 485 pounds.

Homemade machine—doubtful equipment — total lack of training and experience — the moral of this story can be told in one word: DON'T! □

SAFE FLIGHT

Lieutenant Patrick J. Wilson, Inf

The mission is mine, the weather's fine
Think I'll get in the blue.
The plane is OK; was yesterday
There's nothing else to do!

The prop is on high; it's ready to fly
The flaps are on 10 degrees.
I'm nearing the end, I'll need more than 10
Whew! I just cleared the trees!

"Sorry, Sir, but we did miss that fir
And we now are safely flying.
Don't sweat this flight; everything will be right
I've made it before without dying."

"I remember last year, after an evening of beer
I tried to get off that strip.
I was having a ball, but used no flaps at all
So was forced to cut short my trip."

But it's lovely up here; there is nothing to fear
And we're on our way for KMAG.
Got plenty of fuel, obeyed all the rules
But did I check the mags?

There's Seoul and Suwon, on our way to Osan
I'll follow the double rails.
I'll keep 'em in sight, so things won't get tight
In case my ADF fails.

Those clouds to our front, looks like a front
I'd better give Osan a ring.
"600 feet broken" no truer words were spoken
Let's get under this thing.

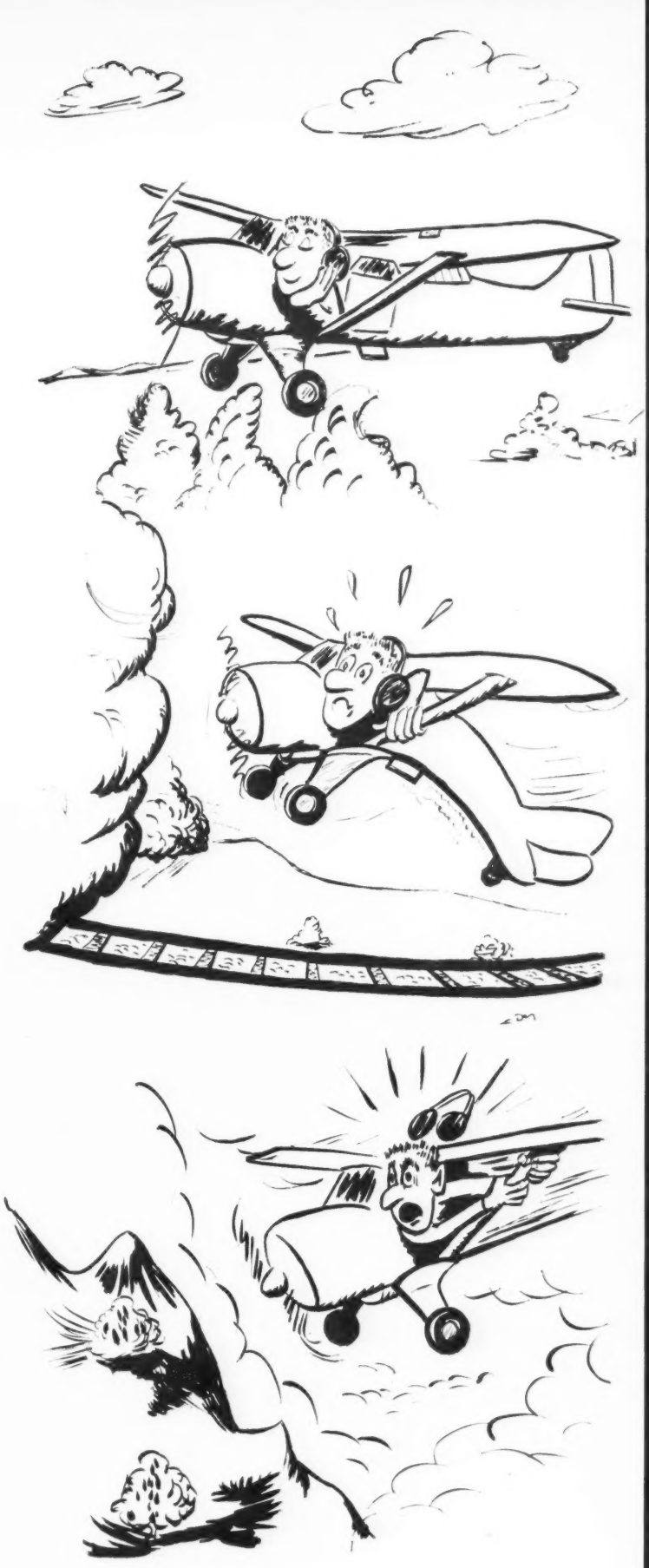
I must go below it, I can't fly over it
My ticket has just expired.
If I worked for TWA, instead of the USA
I would certainly be fired.

Down, down I go—too far below
My 95-8 visibility.
Should I try to hold track, or head on back?
Whoops! I've exceeded my ability.

All turned white, except for the light
My mouth turned suddenly dry.
We tried to get through, so into it we flew
The Colonel, a Beaver, and I.

I couldn't see ahead of me
Not even a foot or two.
Before I knew it, into a mountain I flew it
What else could I do?

Well, oh well, we've landed in hell
And didn't hit our spot.
Colonel Safe-tee is down here with me
And, it's awfully hot.



Contest Rules

THE U. S. ARMY AVIATION DIGEST

ANNUAL WRITING AWARDS

Three annual awards will be given to authors whose articles are considered the best contributions of the fiscal year. For FY 1962 first prize will be $125.00, second prize $75.00, and third prize $50.00.

1. Monthly winners will receive an appropriate certificate of award. Annual award winners will be selected from the 12 monthly award winners.

2. No member of the U. S. ARMY AVIATION DIGEST staff or the Literature Division of the U. S. Army Board for Aviation Accident Research may participate in the contest. Regular departments of the magazine are also excluded.

3. Article topics must be within the scope of the mission of the U. S. ARMY AVIATION DIGEST: "to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data."

4. Articles must not have been submitted to other publications or have been previously published.

5. Articles should be approximately 1,500-2,000 words in length. (This will be approximately 5-6 double-spaced typewritten pages. Entries will not be judged on typing or neatness, however.)

6. Only articles selected for publication will be judged.

7. Articles selected for publication will be retyped in the original wording and be submitted to the judges in unedited form, without bylines.

8. Monthly and annual winners will be chosen based on:

Accuracy	Reader appeal
Completeness	Soundness
Originality	Substance
Readability	Overall merit

* * *

All entries should be mailed to: Editor-in-Chief, U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Ala.

Appropriate pictures, diagrams, charts, etc. necessary to illustrate articles should be backed with protective cardboard for enclosure with the manuscript. Photographs preferably should be 8 x 10 black and white glossy prints. Illustrations will be returned if requested. Articles will not be judged on the artwork or photos submitted.